# ELECTRIC RAILWAY JOURNAL

PUBLISHED EVERY SATURDAY — McGRAW PUBLISHING COMPANY

239 W. 39th St., New York City.
Branch Offices: Chicago, Cleveland, Philadelphia, London.

Vol. XL. **SEPTEMBER 7, 1912** No. 10

Subscription: U. S. and Mexico, $3.00
Canada . . . . $4.50
Other Countries . $6.00



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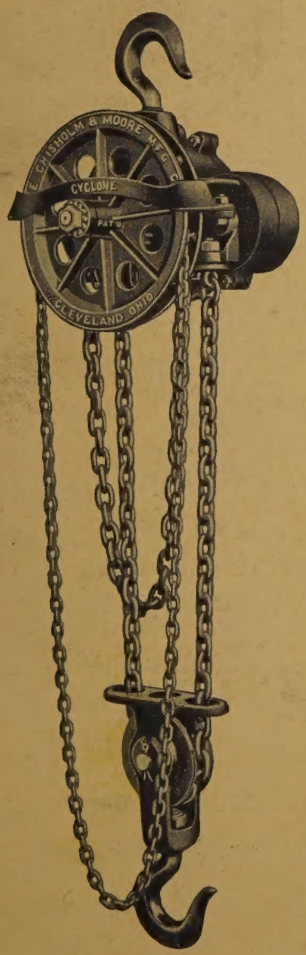


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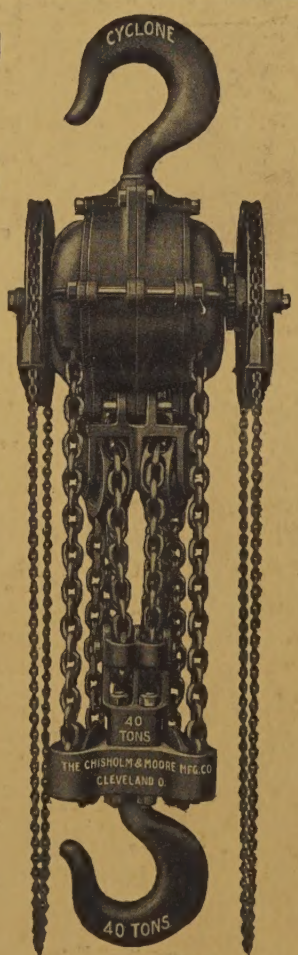


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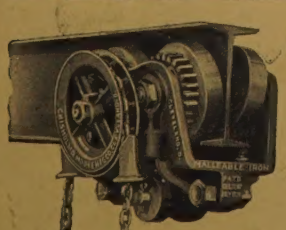

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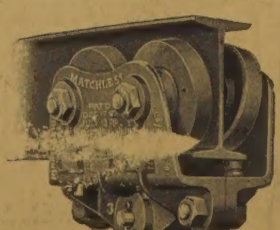

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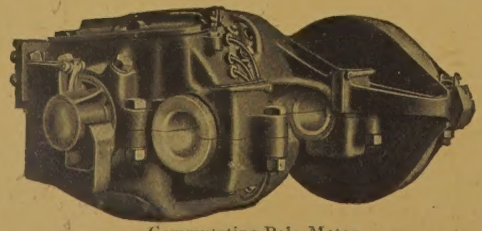
**Alphabetical Index and Classfied Directory fourth page following text**

# Taking A Holiday

"WELL, JOE," said the General Manager to his master mechanic on the afternoon of Labor Day, "I just dropped in to see how things were going."

"Boss," answered Joe, "holidays don't worry me any more since we've had our cars equipped with Westinghouse Commutating Pole Motors and HL Control. Believe me, those Westinghouse people knew what they were doing when they built those motors and that control, but we ought to have some of that new field control the Westinghouse Company have gotten out, then we could make some speed on our 'Park Line,' without chewing up a bunch of power in the city."

"I was just going to tell you, Joe," said the General Manager, "that I expect to look into that proposition when I go to Pittsburgh next week."



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Vol. XL NEW YORK, SATURDAY, SEPTEMBER 7, 1912 No. 10

PUBLISHED WEEKLY BY

## McGraw Publishing Company

JAMES H. McGRAW, Pres. C. E. WHITTLESEY, Sec'y and Treas.

239 West 39th Street, New York

TELEPHONE CALL: 4700 BRYANT. CABLE ADDRESS: STRYJOURN, NEW YORK.

CHICAGO OFFICE.....1570 Old Colony Building
CLEVELAND OFFICE.....1021 Schofield Building
PHILADELPHIA OFFICE.....Real Estate Trust Building
EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

TERMS OF SUBSCRIPTION

For 52 weekly issues, and daily convention issues published from time to time in New York City or elsewhere: United States, Cuba and Mexico, $3.00 per year: Canada, $4.50 per year; all other countries, $6.00 per year. Single copies, 10 cents. Foreign subscriptions may be sent to our European office.

Requests for changes of address should be made one week in advance, giving *old* as well as new address. Date on wrapper indicates the month at the end of which subscription expires.

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Entered as second-class matter at the post office at New York, N. Y.

*Of this issue of the* ELECTRIC RAILWAY JOURNAL, 8000 *copies are printed.*

NEW YORK, SATURDAY, SEPTEMBER 7, 1912

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**MOVABLE ELECTRICAL DISPLAYS**

Interurban railways that sell or desire to sell electrical energy for minor industrial uses to people within easy distance of their lines will be interested in the account of the Albany Southern Railroad's electrical display cars, which are described elsewhere in this issue. The idea of carrying the exhibits to each community in turn instead of waiting for possible customers to visit a distant fixed showroom has proved to be quite as happy as Mahomet's fabled discovery that if the mountain would not come to him there was nothing to prevent him from going to the mountain. The success of this company's departure from the usual methods of demonstrating the superiority of electrically operated equipment for farm and home brings out the great advantage which a railway can enjoy in this field either against its lighting rival or in developing virgin territory. The countryman and his wife are not easily induced to take a long trip for the sake of examining a "new-fangled" tool, but they can hardly resist the temptation of seeing it in action when it is brought to their very door. The itinerary of the traveling showroom from town to town should, of course, be well advertised, as was done in this case. The offering of prizes is a good expedient for arousing interest the first time that the car is operated, but thereafter the novelty and utility of the display may well be considered as a sufficient attraction.

**EFFECTIVE SANDING**

Nothing ought to be easier than to drop sand on a rail, but this seems difficult, especially when the sander is expected to do good work regardless of the nature and condition of the material which is put into it. Why should every car on a railway carry a complex, costly mechanism to churn lumpy, sticky sand, when a few dollars spent at each carhouse will kill the evil of poor sanding at its root? It is not at all necessary that the small road should install the elaborate sand driers which the large city system can afford. For all practical purposes, the same end can be obtained by using one of the many simple stoves which have been developed for this purpose. These stoves are usually built with a conical or funnel-shaped reservoir into the top of which wet, coarse sand is shoveled and from whose bottom openings it passes out thoroughly dry and disintegrated. In this condition the gravel can be easily screened out. Live steam piping is not to be recommended for drying because leaky joints will only increase the moisture in the sand; furthermore, in the summer such a steam plant would require much more attention than a stove. It is not enough, however, to make the sand dry. Equal attention must be given to keep it dry. The storage bins should not be located at the floor level nor in those parts of the carhouse which are always open to the atmosphere. Finally, the sand boxes should be inclosed under a seat and adjacent to the stove or heaters. Of course, the mechanism is somewhat simplified if the sand box is next to the motorman, but this is not good practice unless the vestibule is kept dry and warm. Furthermore, this arrangement would not be in accord with the wise tendency to

limit to a minimum the size and number of operating details on the platforms of city cars in order to give both the motorman and the departing passengers the least impediments to rapid movement. It is clear that if the sand is of the right quality to begin with and is kept well grained and dry until the moment of application, the construction and cost of the sand box will be reduced to the lowest terms. Under certain conditions where a strong wind might blow the sand off the track before it could reach the wheel, it may be necessary to install a means to deliver the sand directly at the point of contact between the wheel and the rail. It is not essential, however, to use expensive sand boxes in city service when it is possible to stop at carhouses to replenish them with good stock at frequent intervals.

### T-RAIL IN PAVED STREETS

The use of T-rail in paved streets has received further encouragement from the action of the Public Utilities Commission of Connecticut in its recent decision approving the continued use of the rail in Grand Avenue, New Haven, one of the important streets as regards vehicular traffic in that city. The T-rail has always been used very extensively, if not exclusively, in New Haven, and when the time came for relocating portions of its double-track line in that street and making some extensions the company proposed to use the T-rail section. Objection was raised to this plan by the Mayor and Board of Aldermen, who demanded a grooved girder rail. The city claimed that the T-rail was an impediment to vehicular travel and that it was almost impossible to keep any kind of pavement in good repair adjoining the rails, although some of the city's witnesses dissented from the latter claim. But the especially interesting feature of the decision of the commission, which was in favor of the T-rail and is published in abstract elsewhere in this issue, was in its emphasis of the fact that for automobiles and other rubber-tired vehicles the type of rail, whether T or girder, made no particular difference and that the T-rail was safer and better than the grooved rail for street railway operation and for the comfort, convenience and safety of the street railway patrons. The commission was not satisfied that the T-rail was as desirable for steel-tired wagons, especially those of the lighter type, but, in considering the character and the volume of traffic over the location in question, it concluded that advantages of the T-rail outweighed its disadvantages for this particular class of vehicle. The decision is the first one with which we are acquainted in which the effect of the change in the character of vehicular traffic caused by the increasingly large number of automobiles and the decrease in light steel-tired wagons has been considered in relation to the type of street railway rail suitable to be laid in paved streets. The broad cushioned tires used on automobiles meet no impediment in the T-rail when embedded in the pavement in the usual way, so that the principal problem in T-rail track construction lies in the construction of the pavement adjoining the rail so that it will not be broken down by heavy truckage. Automobiles have introduced many problems in the proper construction of street pavement, but they have at least simplified this question of rail sections.

### PASSENGER-HANDLING RECORDS

The appearance of the new near-side, center-entrance and double-deck cars has already led to some ardent discussions concerning the comparative loading and unloading efficiency of these types. In former days the arguments on this subject were confined principally to the retarding or accelerating effect as regards loading of different arrangements of seating. The field for discussion has been greatly broadened, however, by the development, first, of the end-platform prepayment designs with their separate exits and entrances, and second, by the introduction of the several low-entrance cars. It is therefore no longer a question merely as to what is the most desirable combination of transverse and longitudinal seats, but still more of determining what kind of car can be boarded with the greatest speed and safety and with the least interference from alighting passengers. There can be no doubt that the low-entrance construction greatly facilitates the initial movement of the boarding passenger, that is, from the pavement to the conductor; but the slowing effect of the ramp or step leading to the seats is yet to be determined. Nevertheless, experience with end-platform cars indicates pretty clearly that the low-entrance cars will show a net reduction in the time required for stops so long as their fare-paying space is enough to carry six or eight passengers at one time.

No comparison of the passenger-handling speed of various types of prepayment cars can be satisfying unless a plain distinction is made between figures obtained at congested corners and those secured in normal stop-to-stop operation from one end of the route to the other. In either case the time required for stopping and starting will be a constant, or almost a constant, whether the car takes one passenger or ten. Data taken at the congested corners will show a faster passenger movement than elsewhere because the motorman and conductor usually open the doors before the car has come to a standstill, while the eager passengers are frequently guided to the best advantage by the local traffic inspector. On the other hand, stop-to-stop operation may mean taking as much time to handle one passenger as a dozen. The radically different results to which these diverse observations lead are indicated by the fact that according to a count taken under terminal loading conditions a car with a step 17 in. high admitted one passenger every 1.57 seconds, whereas according to the method of averaging all stops a car with a 14-in. step exceeded 2 seconds per passenger. A similar, though less important, distinction should be made between figures obtained in the rush hours and those secured during the middle of the day, when many of the passengers are women with packages.

The rate of passenger interchange—that is, the time required to handle a given number of boarding and alighting passengers—is of particular importance in a comparison of end-platform cars with the near-side, center-entrance and double-deck cars. In the case of the end-platform car an extended series of observations by one company showed that the unit rate for passenger interchange on cars with 17-in. steps varied from 1.94 seconds for cross-seat cars to as low as 1.73 seconds for longitudinal-seat cars, two exits being available. On the other hand, in cars where but one area is used for inward and outward movement the rate

of interchange has been noted as about 0.5 second higher under crowded conditions, but not in normal running. It is also to be expected that the double-deck cars will prove somewhat slower than a combination of motor car and trailer in view of the stairway climb and the smaller number of passages. The foregoing figures indicate clearly the desirability in any records of this kind of a statement of the conditions under which passenger-movement trials are made so that the advantages or disadvantages of the car for given traffic conditions may be universally understood.

## SHORTENING ROUTES WHEN TRAFFIC IS LIGHT

Substantial economies in operation may be effected by the shortening of routes during non-rush hours on systems which permit traffic to be handled through other channels without injuring the general quality of the service. A typical case recently came before the Massachusetts Railroad Commission upon the appeal of an improvement association for the restoration of through service upon the North Station-Columbia Road-Mattapan surface line of the Boston Elevated Railway Company, the petitioners desiring through cars from terminal to terminal at all hours of the day. The company had discontinued through service upon this line except during the morning and evening rush hours, but it had provided a greatly enlarged parallel service from Mattapan to the heart of the city and thence to the North Station by the introduction of new and modern semi-convertible cars. These cars ran between Mattapan and the Dudley Street elevated station, the last portion of the inward and first portion of the outward journey being accomplished by transfer to high-speed trains running between Dudley Street and the business district through the Washington Street tunnel.

The commission sustained the company's withdrawal of the former all-day through surface-car service, pointing out that the new facilities provided for much faster transit and offered more than double the former number of seats per hour between Mattapan and the business center. The local cars formerly run through Columbia Road from the North Station to Mattapan were of smaller size than the semi-convertibles lately placed in service on the parallel inward and outward services, the respective seating capacities being thirty-four and fifty-two per car. The company offset the shortening of the through route on the Columbia Road line by establishing a free transfer point at the intersection of that line with the Mattapan-Dudley Street trunk route, and in this way saved sixteen minutes on each surface round trip. Traffic was properly diverted to the trunk line of travel, where it could be more economically and advantageously handled from the standpoint of the company and the greater portion of the public than on the devious and handicapped surface route in question. The board pointed out that there is no unreasonable inconvenience to the public in being obliged to make a single transfer in a distance of over 7½ miles upon a line which is not a main artery of travel. During the rush hours the original through service is maintained by the company on the surface line route under consideration, but at other times, the company contended, the operation of the smaller cars on the same tracks with the larger units would cut down the schedule speeds possible with the latter, and the commission recognized the soundness of this view. The transfer of traffic to the parallel trunk route and the reduction of through service thus enabled was a step in the direction of legitimate economy, and on complex transportation systems opportunities of this kind may occasionally be improved with positive saving in the cost of conducting the service.

## DUTY OF RAILWAY COMPANIES IN CASUALTY CASES

The ethical duty of railway companies in casualty cases has been brought prominently to the front during the last two or three weeks by public criticism of the practice of the Chicago Railways before the City Council and in the daily papers. The practice of the Chicago company in its conduct of accident relief does not differ greatly from that which a number of other electric railways have followed, so that, in a sense, the entire system under which electric railway companies in cities provide prompt action in accidents, coupled in some cases with hospital care, is under indictment.

The present system in its most complete form provides means for the prompt relief of persons who are injured by the cars of the company and their prompt transfer to some one of a number of recognized hospitals, in case other ambulance service is not as quickly available, so that the patient may receive early medical treatment. This plan is the natural outgrowth of the effort to provide some sort of temporary treatment in case of accident until expert medical advice is available, and of itself it seems a humanitarian policy. But the charge was made in the Chicago case, and has been made in other cases, that because of its possible liability to the injured person for the accident the company is an interested party and that the ambulance of the company would probably convey the patient to some hospital where the physicians were favorable to the company, where its legal representatives could call upon the patient and where the medical report of the results of the accident would be biased in favor of the company or at least would not be biased in favor of the patient and possible future litigant. The defence of the Chicago Railways to these charges is complete. The company seems to have extended medical relief to persons injured regardless of whether the accident occurred through their own fault or through negligence of the company, the company's aid has been tendered only when its ambulance was the first to reach the scene of accident, the various hospitals used were among the best in the city, and the injured person has not been taken to any hospital without his consent. The company explains its selection of certain hospitals on the ground that those chosen were the best fitted for the treatment of accident cases. The chief question in this and in other cases where the same criticisms have been made is, therefore, whether a railway company which admittedly has a possible financial interest in the ultimate effect of car accidents should be allowed to administer any sort of relief.

On this point we think there should hardly be any question either from the standpoint of the individual affected or of the community. In practically all cases of accident

the most important desideratum is good and prompt medical attention at a reputable institution, and if this is assured we fail to see why the railway company should be barred from helping to secure it because it occasionally may be equally interested with the sufferer in minimizing the results of the accident.

## FRANCHISES AND FARES IN MILWAUKEE

In two points of fundamental importance the conclusions of the Railroad Commission of Wisconsin in the Milwaukee case, extracts from which were published in last week's issue, concern the attitude of the electric railway industry toward the serious public questions of franchises and rate of fares. The process of reasoning and of determination of values upon which the decision is based are of much interest to companies that are confronted by conditions similar to those which prevailed in Milwaukee, but they lead up to what appear to us to be two questions that are of greater significance in their bearing on the future.

The first of the two matters to which we direct attention is the disregard by the commission of contract relations between The Milwaukee Electric Railway & Light Company and the city of Milwaukee, although, in taking this position, the commission undoubtedly believes that it is acting entirely within the law and in the public interest. This is a question of law and not of facts concerning values or internal accounting. Judging from the official statement issued by the company, the issue will be based on this point if the decision is taken before the courts for review. The commission says, in effect, that the question whether the city ordinance is a contract that cannot be violated, altered or amended without the consent of both parties is not a pressing issue in view of the decision of the Supreme Court that the provisions of such ordinances relating to limitations of rates of fare are subject to determination as to their reasonableness by the Railroad Commission. The company says that under the existing franchise the city received a reduced rate of fare long before the earnings justified such reduction and that the company has a right to expect the fulfilment of the obligations of the other parties interested in the contract.

Without assuming to be able to express what may be read between the lines of these opinions, we shall amplify the statements so as to show the conditions upon which they are based and the principles of regulations to which they point. The Railroad Commission is a creation of recent years and ideas. It was formed to develop new relations between the public utility companies and the public; in other words, to supersede the old arrangements. With the advanced method of regulation the State offers public utility companies an indeterminate franchise or permit in lieu of existing franchises, permitting the definite contracts with municipalities that were made under the old laws dealing with these matters to be surrendered upon acceptance of the provisions of the new permit. Naturally the change involves submission to the Railroad Commission law. Is it not the idea of the commission, supported by its interpretation of the law if not by the law itself, that the terms of a municipal franchise are not to be regarded as binding, because the State does wish to encourage acceptance of the indeterminate permit in place of the limited franchise, believing that this is the wiser policy for the present and future?

The substance of the statement issued by the company is that, under the city franchise, it fixed a rate of fare in the early years which it was not justified in giving, but that it expected to recoup itself in the later years of operation. The premise of the company in the year of acceptance of the franchise, whether or not founded on accurate judgment of the future, favored the acceptance of a definite contract relation, which it evidently still prefers to the uncertainties that might arise with the changes of state administration possible in succeeding years under an indeterminate permit. If the company did not have, as it intimated, the fares that it might have had in the past, that opportunity appears to be gone. The commission, however, does not take up the other features of the contract at which the company hints; it therefore did not regard them as controlling or influencing factors.

The other feature of the action of the commission which is of great interest is the lower rate of fare which is the purpose of the order. The Milwaukee Electric Railway & Light Company has not been a rigid follower of the 5-cent fare principle. Its ticket rate of fare has been twenty-five rides for $1, and the commission orders the sale of thirteen tickets for 50 cents, or at the rate of twenty-six rides for $1. The new ticket rate of fare, therefore, would be 3.85 cents instead of 4 cents. As over 80 per cent of the riders in Milwaukee take advantage of the reduced rate secured by purchase of the tickets, the revenue of the company would be reduced proportionately unless the slight reduction in rate should induce more riding. In fact the proportion of ticket riders would probably increase, as the unit of purchase is reduced by one-half, that is to say from $1 to 50 cents. The actual effect of the reduction ordered will be revealed, however, only by a trial. If the effect is to give the company enough additional riders without extra expense or liability to offset the difference in revenue per rider, the result on the finances will be negligible. This end, of course, might be attained if the company reduced its service in a degree commensurate with the possible reduction in fare.

If the uniform rate of fare system prevailing in the various cities of the country were subject to analysis, it would be found that there are variations in the length of possible haul, the average length of actual ride and the degree of service rendered. Such analysis, whether made in New York and Chicago, fixed 5-cent fare cities, or in Cleveland and Milwaukee, low-fare cities, would probably disclose some relation between fare and service that, with allowances for differences in company and public, would be approximately the same. The relation, however, is fluctuating and not easily controlled. In this fact lies the weakness of the uniform fare system, particularly where the tendency toward lower rates is a fixed element in the policy of regulating authorities. If the situation is to be remedied, the companies subject to revision as to fares can help toward the solution of the problem by experimentation with a rate system which apportions the cost per ride upon the distance per ride instead of upon an average ride whose distance is not determinable in advance. The Milwaukee

company is wisely prepared to take a step in this direction by the establishment of a system of zone fares for its suburban territory. Similar experimentation by other companies will be a material help in a fair settlement of the question, which is just as necessary for the railways as for the public.

## RAILWAY ELECTRIFICATION

Elsewhere in our columns will be found the admirable paper read before the Turin International Electrical Congress last year by C. O. Mailloux, chairman of the electric traction section. Mr. Mailloux, although well known as an adept in the mathematical theory of electricity, as an engineer is nothing if not practical, and his discussion of the electrification problem is directly along the line of least resistance, as determined by the necessary practical factors in the problem.

The two things in particular on which he laid stress in the paper before us are the "peremptory factors" in any problem of electrification and the "activity factor" of the system. What Mr. Mailloux calls "peremptory factors" in the electrification are those given conditions which are arbitrarily imposed on the engineer by the nature of the task and must be taken into consideration as determining the particular method of attack on the solution of that special problem. For instance, he points out that in the case of the terminal electrification work of the New York Central Railroad the use of the d.c. system with third-rail supply was in fact practically unavoidable, first, because the tunnels were too low for a practicable overhead contact line and, second, because the use of an overhead contact line within the limits of the city of New York was forbidden by law. Here was a peremptory factor which practically forced the use of the third rail d.c. supply irrespective of the weight of all other considerations as regards the choice of system. On the other hand, in the terminal electrification of one of the British railways in London structural considerations made the third-rail out of the question, and thus the peremptory factor demanded the choice of a system entirely different from that equally necessary in New York. Such facts, not fully realized by the general public, often may control the adoption of some particular system at some particular point where on general principles it might seem undesirable.

The second matter brought conspicuously to the front by Mr. Mailloux was the activity factor of a line as determining in many instances the feasibility of electrification. By the activity factor of a line he means what is practically its load factor as regards traffic; in other words, the proportion of the maximum traffic which could be carried on the system if it were fully utilized all the time. This is not the same thing as density of traffic, for density of traffic is an absolute quantity which may imply a less or greater activity factor according to the facilities which are in the physical nature of things available. Where a very high activity factor becomes necessary electrification may be called for quite irrespective of other considerations, but where the activity factor is high only at termini and comfortably low along the main part of the line it very likely will not pay to carry electrification beyond the termini. Consequently, as Mr. Mailloux points out, in the comparatively short European lines electrification of the whole system may be desirable much earlier than it would be on American lines where there are long stretches of lightly loaded track.

The average engineer does not realize how large a part of the cost of electrification under even the best existing methods lies in the contact line. Roughly the contact system, including track bonding, may be reckoned to be half the total cost, the generating and distributing systems about one-quarter and locomotives about the remaining quarter, for the case of the complete electrification of the railways of the United States. Costs must fall very heavily, then, on trackage where the activity factor is low.

Mr. Mailloux divides electrification problems into four cases—first, those clearly not feasible; second, those of dubious practicability; third, those clearly feasible, and fourth, those where electrification is unavoidable from its either forcing itself or being forced upon the railway company. In these last cases the simple question of financial return on the face of the figures is overshadowed either by extreme necessity from the entrance of certain peremptory factors or from legal necessity in case the electrification be forced. In other instances the traffic capacity of the track at certain places must be increased in order to handle the business, or underground or tunnel service must be entered upon, in which case electricity is the only proper method of traction. Aside from cases such as these, the financial return is very properly the controlling factor, and, as Mr. Mailloux clearly points out, the conditions here are altogether different according to whether the line is a new or an old one. Of the former case the Simplon Tunnel line is an admirable example. Here not only did the tunnel conditions demand electrical treatment but there was no equipment to be rendered useless by the adoption of electricity. In the case where much equipment must be scrapped on the adoption of electric traction, the weight of the financial evidence will tell heavily against the change of motive power. It is this financial condition which renders the general electrification of American roads a somewhat remote contingency.

The history of American railroading involves some remarkable instances of high finance, of which the less said the better, but the fact is, whatever may be the underlying reasons in any one case, that very many American roads are carrying a burden of securities barely warranted by their earnings. On some of them electrification would undoubtedly mean a large saving in the long run, but to advise it is like calling the attention of the improvident poor to the fact that flour is to be had cheaper by the barrel than in small quantities. They realize the fact, but do not know where to look for the price of the barrel. Similarly, there are not a few railroads to which electrification would be very welcome, but they hardly know where to look for the good angel who will trust them for the necessary funds in their existing state of bonded indebtedness.

We commend this paper by Mr. Mailloux to our readers as particularly free from extravagances or inclination to exploit some particular system and as replete with the hard common sense which must in the long run be the main reliance of engineers studying problems such as that before us.

# Physical and Operating Features of the East St. Louis & Suburban Railway

**This Is One of the Largest Properties in Illinois Which Operate Combined City and Interurban Service—It Serves a Densely Populated District Across the Mississippi River from St. Louis and Has 900 Coal Cars Which Handle an Immense Traffic**

The East St. Louis & Suburban Company has 185 miles of track in East St. Louis and on its suburban and interurban lines extending from East St. Louis to the southeast, east, northeast and north. A subsidiary company has a lighting load of about 50,000 16-cp equivalents with 3000 meters and a motor load of about 3000 connected horse-power. The territory served by the railway lines is very densely populated. East St. Louis, the third city in Illinois, has a population of 58,000 and is joined on the north by the suburbs of Venice, Madison and Granite City, which are manufacturing districts directly across the river from St. Louis. The city car routes serving these four cities converge at East St. Louis, and many of the cars are operated over the Eads Bridge to a terminal on the St. Louis side of the Mississippi River. The interurban lines traverse a rich, well-populated agricultural district underlaid with coal, and terminate at thriving cities of from 10,000 to 25,000 population located approximately 25 miles from East St. Louis. Passenger and freight services are operated on five lines radiating from East St. Louis, and another line, used for freight traffic only, delivers a daily average of about 4000 tons of coal to the St. Louis Terminal Railway.

The relative location of the city, suburban and interurban lines of the East St. Louis & Suburban Railway Company is shown on the accompanying map.

The East St. Louis & Suburban Company is a holding company for the various lines which are operated by a single organization. The divisions of the property ownership are as follows:

(1) East St. Louis & Suburban Railway Company, which owns single-track interurban lines connecting East St. Louis with Edwardsville via Collinsville and with Lebanon via Edgemont and O'Fallon and a double-track line from East St. Louis to Belleville via Edgemont.

(2) St. Louis & Belleville Electric Railway, a coal-carrying road operated by electric locomotives, which connects East St. Louis with Belleville. No passenger service is given on this line.

(3) East St. Louis Railway Company, which owns the city lines in East St. Louis.

(4) St. Louis & East St. Louis Electric Railway, which operates the lines over the Eads Bridge, 1¼ miles, between East St. Louis and the foot of Washington Avenue in St. Louis. This company leases trackage for street car operation from the St. Louis Terminal Railway Association.

(5) Alton, Granite & St. Louis Traction Company, which owns the interurban line from East St. Louis to Alton with a branch from Granite City to Horseshoe Lake, the local lines in Brooklyn, Venice, Madison, Granite City and Alton and a 9-mile branch from Mitchell on the Alton interurban to Edwardsville.

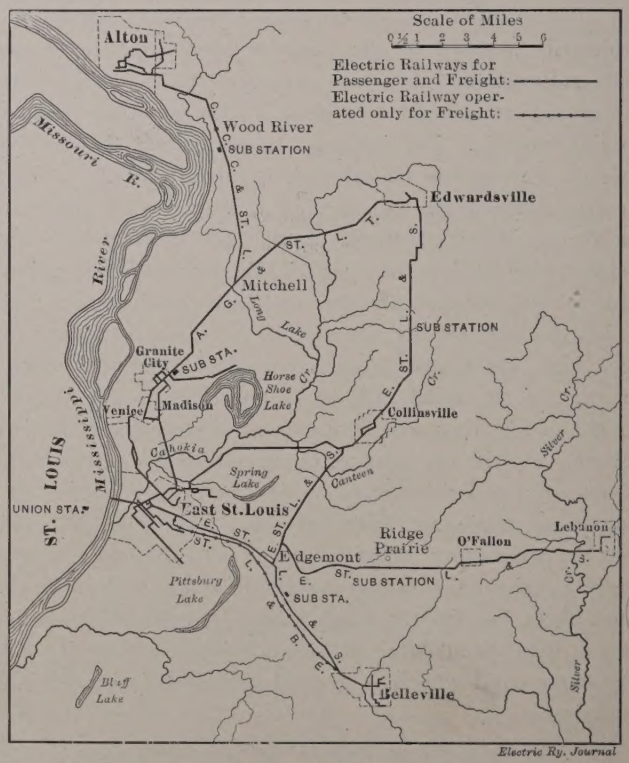
(6) East St. Louis Light & Power Company, which does a general commercial, street and residence, lighting and power business in the East St. Louis district and purchases energy from the East St. Louis & Suburban Railway Company.

(7) Alton Gas & Electric Company, which supplies electrical energy for commercial, residence and street lighting and also furnishes hot-water heat and illuminating gas in the city of Alton. For its heating service the company has a Yaryan heating system which was installed about fifteen years ago.

### TRACK AND ROADWAY

Although this property includes lines built by several different construction organizations, the present management has seen fit in its maintenance work to adopt uniform standards for all lines. As a result of this principle and very generous upkeep expenditures, the several lines now resemble each other very closely in track and overhead construction.

More than half of the track in this system is built in the American Bottoms, which are broad prairies but a few feet above the level of the Mississippi River and protected from flooding by levees. The soil in these bottom lands is a rich alluvial deposit, valuable for truck raising but very unsatisfactory as a foundation for railway tracks. The electric railway has followed the steam railway practice in this




**East St. Louis & Suburban—Map of East St. Louis & Suburban Railway**

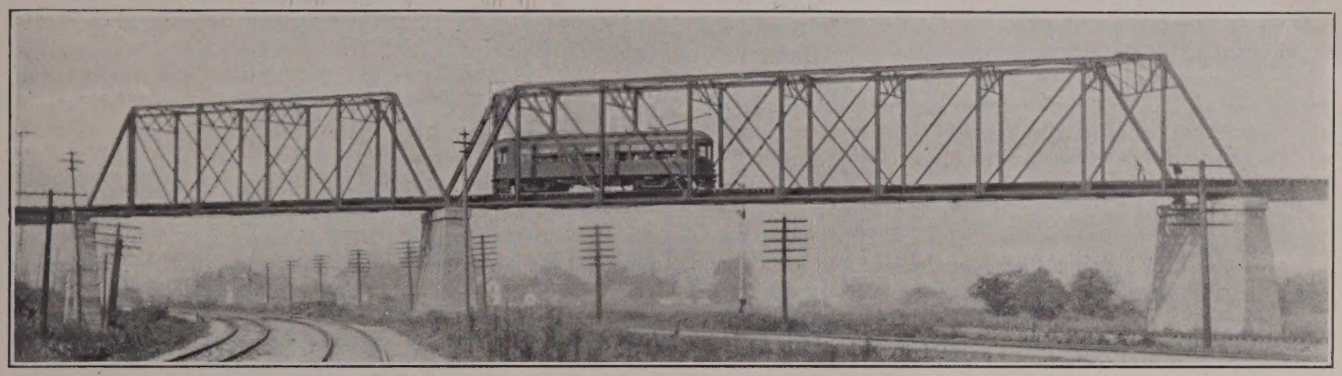
country and has placed its tracks on high embankments, even in flat country. In this way, by reason of the good drainage and by a generous use of ballast, it has obtained a roadbed with fine riding qualities.

The interurban lines between Edwardsville, Collinsville, Edgemont and Belleville are located either on the bluffs parallel with the Mississippi River or on the rolling uplands. The construction of the roadway of these lines is similar to that for most of the lines in the Central States. The most southerly line, that operated for freight traffic only between East St. Louis and Belleville, is 14 miles long. It has a single track on a private right-of-way. This line is built with low grades and long-radius curves so that trains of forty cars may be operated. The western terminal of this coal road is a fourteen-track yard in East St. Louis;

the eastern terminal is at a coal mine just west of Belleville. This track is largely ballasted with cinders.

The Belleville passenger line has two tracks for its full length. These tracks are laid at the sides of a wide highway which closely parallels the Belleville coal road. This line has been resurfaced with cinders and rock ballast. It from there through Granite City and Madison to East St. Louis are on rock ballast. These tracks are now being lifted and resurfaced with cinders placed on top of the rock ballast.

Nearly all the track in the paved streets of East St. Louis is laid with 80-lb. 7-in. or 90-lb. 9-in. girder rail on



**East St. Louis & Suburban—One of Five Viaducts Over Steam Railroads**

is laid with 60-lb. T-rails. The Edgemont-Lebanon line has 18 miles of single track and is laid partly with 85-lb. rail and partly with 60-lb. rail.

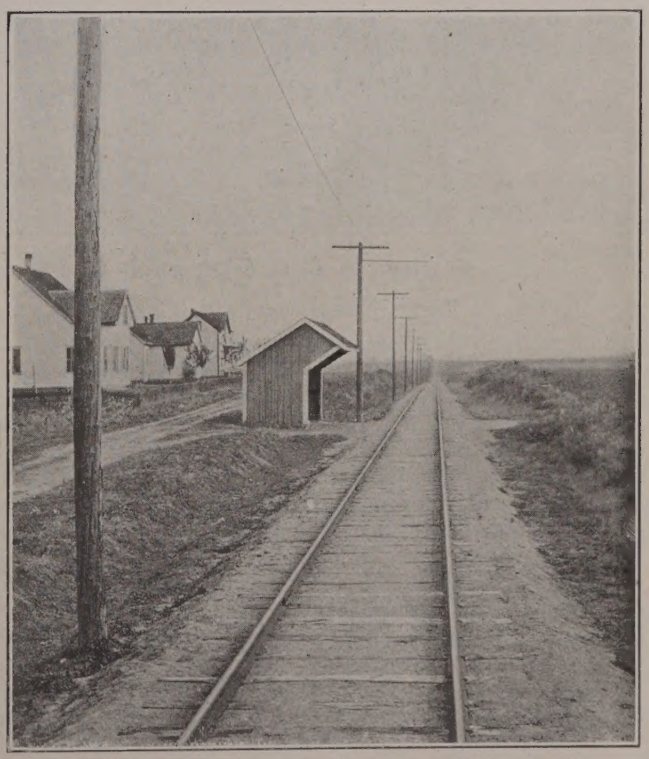
About 10 miles of the track, between O'Fallon and Lebanon, originally was a part of the main line of the Baltimore & Ohio Southwestern Railroad. This company built a new line of lower grade and sold its right-of-way and track to the Suburban railway. The track is ballasted throughout with chatts, or the tailings from zinc mines, obtained from the Joplin (Mo.) zinc district. It is easy to work and if more than 8 in. deep no weeds will grow through it. The excellent appearance of track laid in this

a ballast substructure conforming to the latest designs of city track construction. Replacements are made with 125-lb. 9-in. rail.

On the Alton line are five steel viaducts over steam roads, ranging in cost from $20,000 to $80,000. Illustrations of these are shown.

Continuous rail joints are used on both city and interurban track rails. On open track, which originally was bonded with soldered bonds, new bonds are being installed by the electric welding and brazing process of the Electric Railway Improvement Company, of Cleveland, Ohio. On all new track the Ohio Brass Company's compressed ter-

**East St. Louis & Suburban—Selector Signal at Siding on Interurban Division**



**East St. Louis & Suburban—Typical Section of Track Ballasted with Chatts**

ballast is shown by accompanying engravings from photographs taken on this line.

The Edgemont-Edwardsville line and the cut-off between East St. Louis and Collinsville are built largely on private rights-of-way with 75-lb. rail and are ballasted with chatts. The lines from Alton and Edwardsville to Mitchell and

minal bonds with the thermit process of soldering are used.

The East Side Levee and Sanitary District is building a drainage canal and a high levee parallel with the Mississippi River. This work is close to the Alton interurban line. At the crossing of the Alton line with the drainage canal the Sanitary District has erected for the electric rail-

way a permanent deck-girder bridge consisting of five 55-ft. spans with girders 6 ft. deep designed for Cooper E-50 loading.

SUBSTATIONS

Seven modern substations feed this company's 110 miles of interurban lines. The trolley wires of the East St. Louis city lines are fed direct from the main generating system at Winstanley, a suburb of East St. Louis. Energy is supplied to the other substation transformers by three-phase, 25-cycle, 13,200-volt transmission lines, carried on the trolley poles. The high-tension conductors are stranded aluminum and solid copper. The transmission wires at each substation and at the power house are protected from lightning discharges by installations of 15,000-volt aluminum-cell lightning arresters of General Electric manufacture. Formerly an iron ground wire was installed above some of the high-tension lines, but on account of the excellent service rendered by the aluminum-cell arresters and the continued breakage of the iron ground wire, due to rusting, it has been removed from the poles.

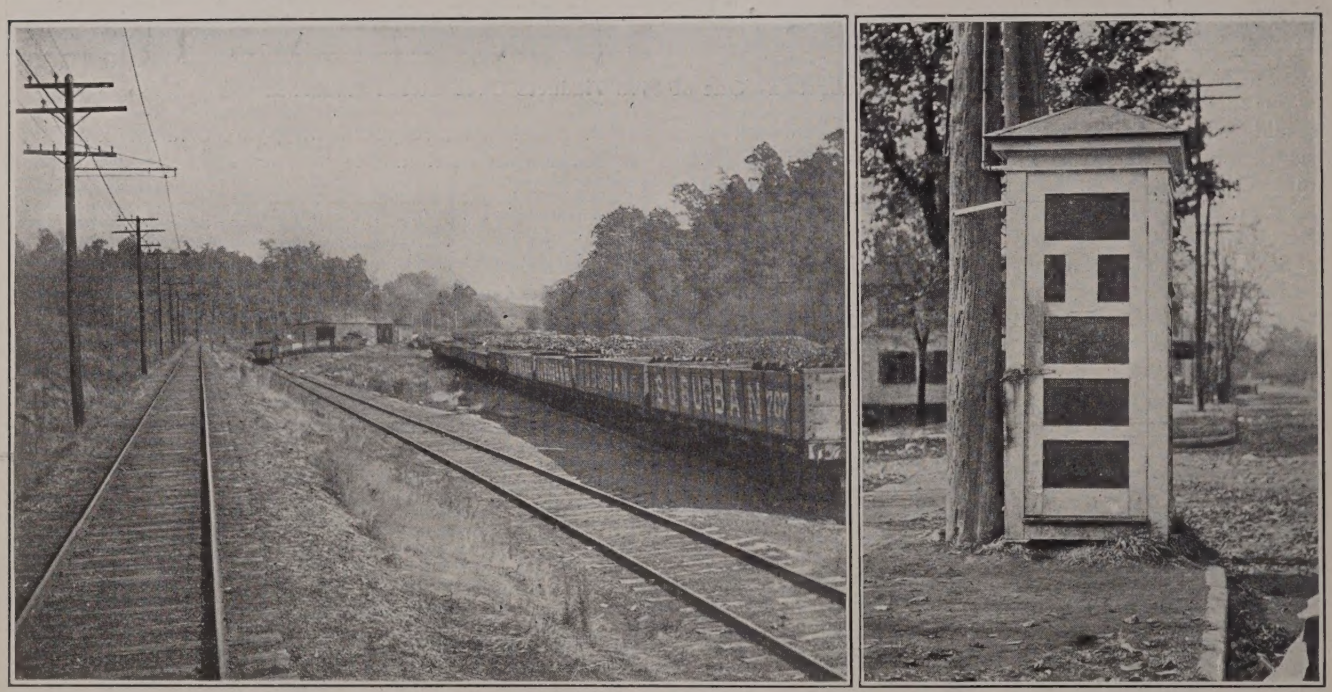
The substations of the East St. Louis & Suburban lines have been designed with a view to simplicity. Each consists of a brick building with a truss-supported roof and with concrete floors and foundations. All the electrical equipment and a.c. wiring is placed above the floor level. The a.c. switchboard panels are directly in front of the transformer groups, reactances and line oil switches which they control; the d.c. generator and feeder panels are placed at the end of the building facing the end rotary converter. This arrangement greatly simplifies the wiring connections and reduces the amount of cable required. The oil switches, which are hand-operated, are inclosed in concrete cells. The high-tension equipment in each substation is protected by electrolytic lightning arresters. The window openings in the substations are glazed with wire glass, and the interior walls of the substations are painted white to improve the illumination.

The seven substations for the interurban and suburban lines include rotary converters with a total capacity of 4300 kw. The d.c. feeders out of the substations are equipped with electrolytic lightning arresters.

At the O'Fallon substation, which has two 200-kw General Electric rotaries, a Crocker-Wheeler booster is used to supply energy to a 3-mile booster feeder extending toward Lebanon, which is 10 miles distant. The excess pressure on this feeder is 200 volts. A small generating station in connection with the hot-water heating plant at Alton includes a 500-kw rotary for operating the north end of the Alton and Granite City interurban line and the local city lines in Alton.

OVERHEAD CONSTRUCTION

No. 000 round trolley wire is used on most of the interurban lines except the Alton line, which is No. 000 grooved. No. 00 wire is used on the city lines. The two lines to Belleville and the Alton interurban are span construction. The mast-arm supports for the other interurban lines are of the flexible type and are mounted on the poles used for the transmission line. A large amount of aluminum feeder is used in connection with the trolley distribution system. The No. 0000 trolley wire on the Belleville freight road is supported by span construction, and since this line, which at times requires very large amounts of current for use on the locomotives, is parallel with the double-track passenger line to Belleville, the copper on the two lines is tied together through automatic circuit-breakers. Thus ordinarily the capacity of one line assists the other, according to the demand, but if a short occurs the circuit-breaker immediately clears the inoperative line.




**East St. Louis & Suburban—Coal Storage Yards and Typical Telephone Booth**

The Alton line formerly had double trolley wire construction, but it was found that when one wire broke it usually made the other useless and so one of the trolley wires was transferred to the poles and now serves only as a feeder.

At switches on the high-speed division the trolley wire over the siding track has been connected with the main-line trolley wire by the Rymco high-speed trolley switch, which is automatically operated by the track switch and removes the need for transferring the trolley pole from one parallel wire to another.

Trouble has been experienced on the 2 miles of track jointly operated by steam and electric trains on the Lebanon division of the East St. Louis & Belleville line, because of the sulphurous gases from the steam locomotives attacking the galvanized strand used to support the trolley wires, and so plans have been made for replacing the iron strands with "copper-clad" strand. It is stated that the smoke from the locomotives has not affected the trolley insulation.

Telephone booths are installed at each siding, and these

booths are provided with single-throw double-pole switches which automatically disconnect the telephone sets from the line wires when the booth doors are closed. A view of a typical booth is shown.

POLE REINFORCEMENT

The East St. Louis & Suburban Company has about 28,000 poles on its lines. Many of these poles have been in service from eight to ten years and so plans for renewing and strengthening all of the older poles have been inaugurated. The method of reinforcing consists in placing an 18-in. concrete collar around the pole at the ground line and at such a level that the concrete will extend about 8 in. above the surface of the ground. This concrete collar is reinforced by two layers of expanded metal. Before the application of the collar to an old pole the decayed wood is removed and the pole is treated with two coats of C-A-Wood-Preserver or Carbolineum Avenarius applied hot with brushes. Both of these preservatives have been used in rather large quantities on this property to prolong the life of the timber.

New poles are set without reinforcement, but after sufficient time has elapsed to assure complete settlement of the dirt around the poles, concrete collars of the shape described are placed around them. It is expected that this form of protection for new poles, which includes the application of two coats of preservative over the entire butts, will secure for cedar poles a life of approximately twenty years.

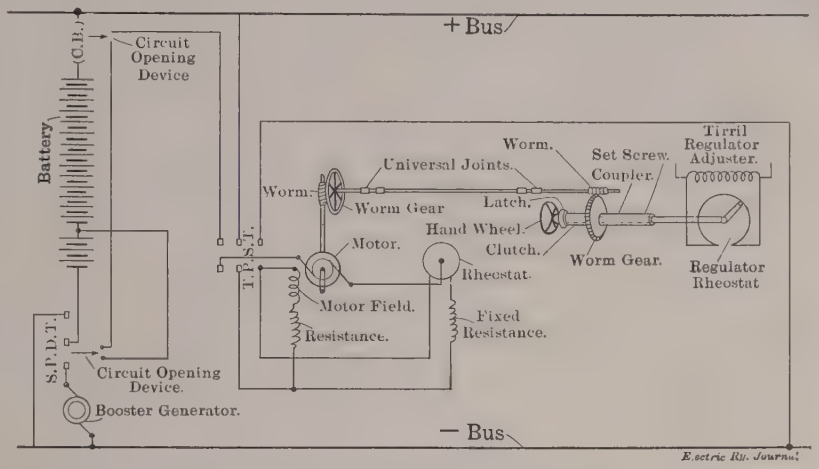
POWER STATION

Previous to the consolidation of the several suburban lines with the East St. Louis city lines energy for operating the cars was supplied by small and separate plants. At the time of the consolidation it became desirable to consolidate these plants and erect a transmission line for supplying the interurban lines through rotary-converter substations. The central power station was built at Winstanley, which is in

**East St. Louis & Suburban—Typical Substation on Interurban Division**

the eastern part of East St. Louis close to the junction between this company's coal line from Belleville and the St. Louis Terminal Railway. The smaller plants located on the bluffs 10 miles to the east of the river had experienced considerable trouble by reason of scarcity and poor quality of water.

The work of excavation and pile driving for the Winstanley station was begun in 1902 and the original machinery installation was made during the winter of 1902 and 1903. At that time the plant carried a railway load only. The original equipment consisted of two 425-kw, 550-volt railway generators, driven by two St. Louis Corliss engines, and two 750-kw, 13,200-volt, 25-cycle generators, driven by engines of the same type, all non-condensing. Shortly after the station was put into service an electric lighting and power company was absorbed, and two 420-kw motor-gen-



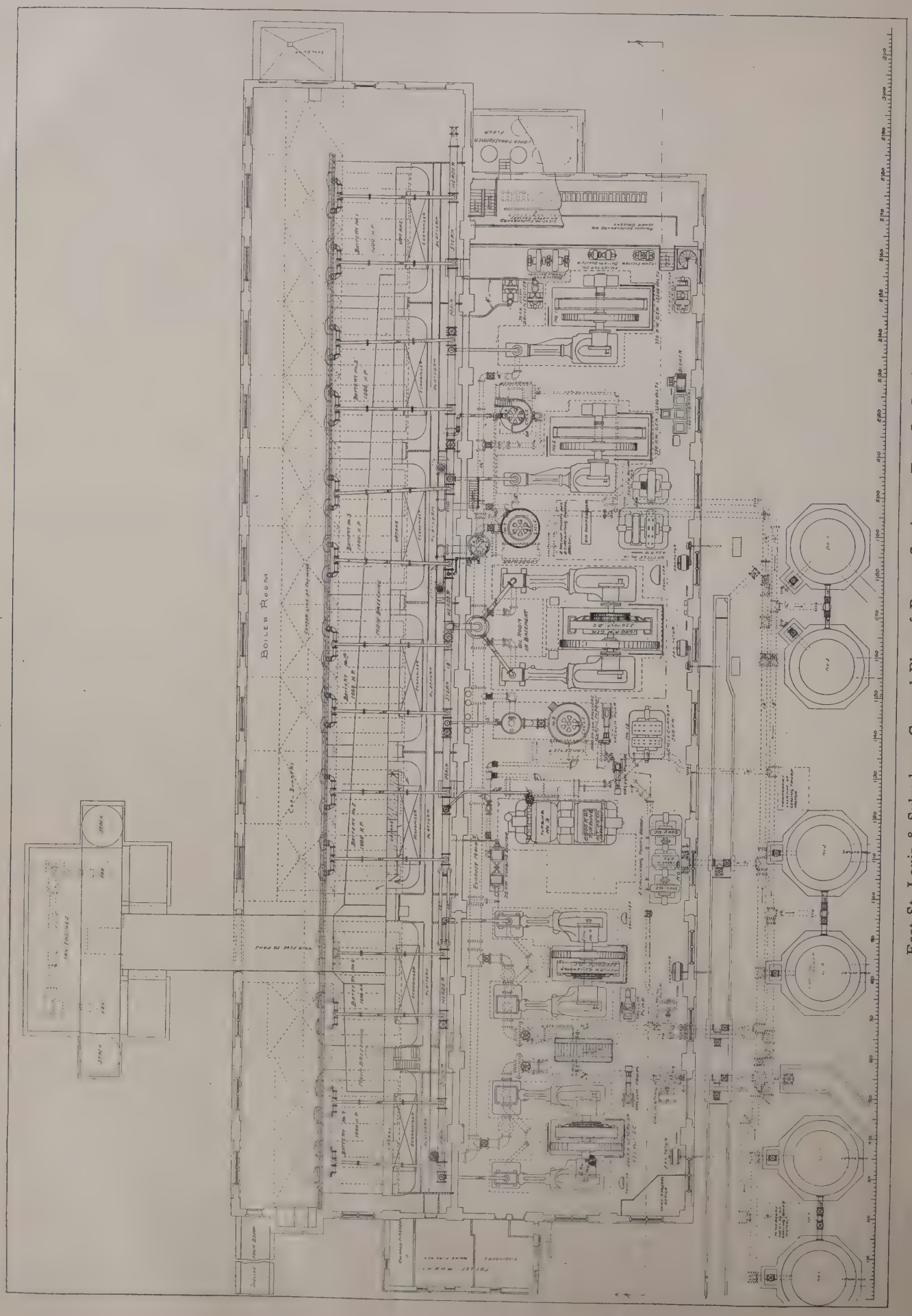

**East St. Louis & Suburban—Diagram of Connections for Automatic Average Adjuster**

erator sets were put in service for supplying current for lighting and a 300-kw motor-generator was installed for the 500-volt non-grounded power circuit. About that time it became apparent that the load was growing so rapidly that the space then in reserve in the engine room would have to be utilized with a unit of the maximum possible capacity. The construction of the O'Fallon-Lebanon line in 1904 again increased the demand for power and made necessary the installation of additional units. During 1903 and 1904 a great many mechanical stokers had been placed in operation in and about St. Louis and many new factories had been built, thus creating a demand for slack coal, for which previously there had been no sale. Owing to this condition the price of fuel rose to nearly $1 per ton.

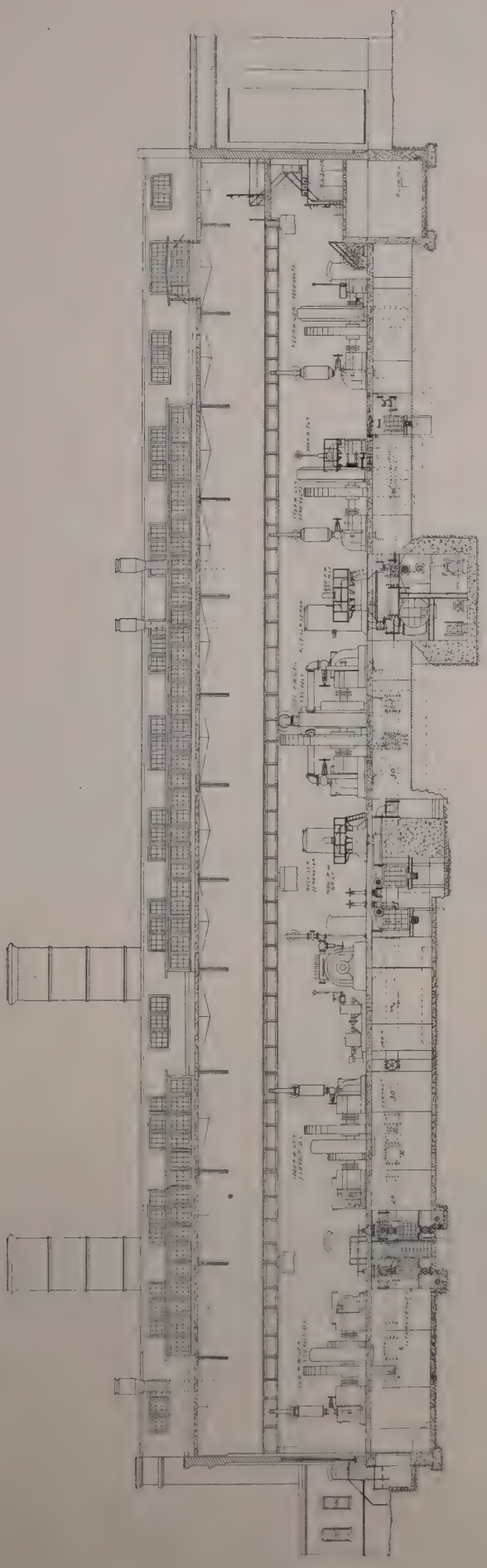
EXHAUST STEAM TURBINE

At about this time the first turbines to use exhaust steam were being offered in this country. As this type of generating unit required but small floor space and apparently afforded an economical method of using the exhaust steam which formerly had been discharged to atmosphere and had now become very valuable on account of increased cost of coal, it was decided to install a low-pressure turbine of 800-kw capacity with the necessary cooling towers, condensers and pumps. Conditions were such that if this unit should be found satisfactory there still would be steam remaining to supply another exhaust turbine of 1000-kw capacity. It was the idea that these two units would be operated at their maximum capacity only at such times as the reciprocating engines were fully loaded.

There was, however, a possibility that a heavy demand for a.c. as supplied by the turbines might be made at times when the d.c. demand fulfilled by the engine units was not at its maximum; therefore some arrangement for helping out the turbines which would operate automatically was desirable. Reserve capacity was obtained by the installation of a storage battery provided with a booster equipment for charging and discharging in connection with the 575-volt d.c. railway buses. An important function of the battery, however, was to relieve the low-pressure turbines from some of the peaks on the a.c. system and means for fulfilling this duty had to be devised. The problem was met by floating a 500-kw rotary converter between the 575-volt battery-fed railway buses and the a.c. buses and by designing a special arrangement of a small exciter voltage regu-




East St. Louis & Suburban—General Plan of Power Station at East St. Louis



East St. Louis & Suburban—Longitudinal Section of Power Station on Section Line Shown on Page 362

lator and carbon resistances to transfer the peaks of the a.c. system through the rotary converter rather than to overload the exhaust steam turbine units.

The battery consists of 300 chloride accumulator cells of 1280 amp-hr. capacity. The rate of charge and discharge is governed by a Tirrill current regulator and an average adjuster. This regulator short-circuits the battery booster field resistance in the same manner that a Tirrill voltage regulator cuts resistance in and out of an exciter field. The adjustments are such as to give a full 250-volt field voltage to the battery booster on either charge or discharge, according to the load. In connection with the average adjuster the Tirrill current regulator serves to transfer the peaks instantaneously to the battery and then gradually to transfer them back to the turbine or engine-driven generator. The principal mechanical and electrical connections for the automatic average adjuster are shown in the accompanying engraving. The flexibility of the plant also was increased by the installation of a 600-kw motor-generator set connecting the 575-volt railway buses with the three-phase a.c. 13,200-volt transmission system and by the installation of a 500-kw motor generator set for changing 2300-volt, three-phase, 60-cycle a.c. to 13,200-volt, three-phase, 25-cycle a.c. These units provide means for balancing and distributing the various demands on the station to all of the generating units and also serve to make any unit in the station available for delivering any of the three kinds of current which make up the station output.

The results with the 800-kw exhaust steam Curtis turbine were such that a 1000-kw turbine of the same design was ordered later. Delivery could not be had for a year, and in the meantime the lighting load had outgrown the motor generators which supplied this current. Additional generating capacity for 60-cycle current was obtained by installing a 500-kw Curtis steam turbine together with a condenser and auxiliaries. This new unit occupied the only remaining floor space, and as the demand for power still increased it became imperative that an addition be built. This was completed in 1906, and the machinery installed included two 1000-kw cross-compound condensing engine-driven generators. A 2000-kw, 13,200-volt, 25-cycle Curtis horizontal turbine unit has since been installed. The condenser for this turbine has 7000 ft. of cooling surface and is of the Wheeler admiralty type with valveless hot-well pumps and an Alberger straight-line air pump.

The steam and electrical generating equipment of the Winstanley power station now includes the following units:

Horizontal condensing Curtis turbo-generator, 2000-kw, 25-cycle, 13,200-volt.

Vertical low-pressure Curtis turbo-generator, two-pole, 800-kw, 25-cycle, 13,200-volt.

Vertical low-pressure Curtis turbo-generator, ½ lb. initial steam pressure, 1000-kw, 60-cycle, 2300-volt.

Vertical high-pressure Curtis turbo-generator, 500-kw, 2300-volt, 60-cycle.

A Fulton Corliss twin simple engine, 34 in. and 34 in. x 60 in., 75 r.p.m., direct-connected to a 1600-kw railway generator.

Two St. Louis Corliss engines, 32 in. x 48 in., 96½ r.p.m., driving two 750-kw, 25-cycle, 13,200-volt generators.

One Curtis 75-kw, 2400-r.p.m., 125-volt turbo-exciter set.

The electrical conversion units are as follows:

Two motor-generator sets, each made up of a 2300-volt, 60-cycle, 425-kw machine and a 575-volt, 800-hp. machine.

One frequency changer, consisting of a 710-hp, 2300-volt, 60-cycle machine and a 13,200-volt, 25-cycle machine. This frequency changer ties together two a.c. systems.

One three-machine motor-generator unit, consisting of two 300-kw, 575-volt railway machines and one 630-kw, 13,200-volt, 25-cycle synchronous motor. This unit is used to transfer the load between the a.c. buses and the d.c. railway feeder and the commercial power buses.

One 500-kw, 25-cycle, 600-volt, six-phase rotary floating

between the 13,200-volt, 25-cycle railway bus and the storage battery bus. This rotary serves to permit the battery to take the peaks off the 13,200-volt a.c. bus and also helps the engines momentarily until the steam from the high-pressure cylinders has had time to pass through the exhaust system to the low-pressure turbines.

**East St. Louis & Suburban—Pay-as-You-Enter Car**

STEAM SUPPLY

The boiler equipment includes seven pairs of 500-hp Heine boilers, each with grates 9 ft. x 12 ft. of the Green traveling-link type. Each battery delivers its waste gases through a Green fuel economizer into a straight run of breeching which connects through a cross flue with the intakes of two 21-ft. x 7-ft. steam-driven fans built in a separate housing directly between the two stacks. The engines which drive these fans are 175-hp Fulton Corliss engines, non-condensing, and they exhaust into the low-pressure system and thus help to feed the low-pressure turbines.

The low-pressure turbines receive their steam supply from the two 1200-hp St. Louis engines and the twin simple engine driving the 1600-kw unit.

The Winstanley power station is not far from the Mississippi River and the subsoil consists largely of alluvial deposit and quicksand. Because of the nature of the subsoil brick stacks could not be built and therefore individual guyed steel stacks were erected for each 1000-hp battery of boilers. These stacks were blown down by a tornado about a year after their erection. Shortly thereafter the boiler settings were rebuilt, and work was begun on the installation of induced-draft fans and economizers to take the place of the high steel stacks.

As the water supply in East St. Louis is not well fitted for boiler feeding, the company is obliged to purchase city water and accordingly has installed six cooling towers with motor-driven blast fans. The company has its own deep wells on the power-house property, but the water is alkaline, containing both potassium and lime, elements which form scale very quickly in the boiler tubes and stain the cooling towers gray. Accordingly this deep-well water is used only for washing purposes and water from the municipal supply department is used for boiler feeding and for the circulating water system.

The cooling tower plant consists of two Alberger and four Wheeler steel towers, each 19 ft. in diameter and 60 ft. high. These towers have a capacity for 6000 kw of generating units. Additional cooling capacity has recently been added by the construction of a spray pond. This pond is 66 ft. x 121 ft. in area and 6 ft. deep. It is built of concrete and has 132 2-in. spray nozzles. A larger pond with 272 spray nozzles has been contemplated. These two ponds will add about 2000-kw capacity to the condensing water facilities during hot summer months.

ROLLING STOCK EQUIPMENT

Illustrations of some of the types of rolling stock are presented. There are twenty-one interurban cars each about 55 ft. long and arranged for train operation, twenty-six suburban cars each 46 ft. long, 103 city cars 32 ft. to 42 ft. long, fourteen of which are pay-as-you-enter type; thirty-six service cars, four large motor express cars, two 50-ton electric locomotives, two steam locomotives and about 900 80,000-lb. coal cars.

On all of the later types of cars for suburban use type M control and the National Brake & Electric Company's emergency straight-air brake equipment have been installed. All city cars with platform control have their controllers equipped with automotoneers, and it is stated that these devices have greatly reduced the cost of controller maintenance because they require the motorman to stop the controller handle exactly on the notches.

PASSENGER SERVICE

The number of regular and tripper cars in daily service in 1911 averaged 111.

The East St. Louis city lines are operated on an average of 7½-minute headway. The traffic on the 15-mile double-track line from East St. Louis to Belleville is very heavy, requiring at times twenty cars. The one-way fare from Belleville to East St. Louis is 15 cents, and from Belleville to St. Louis it is 20 cents. Belleville is a city of 25,000 people. The territory between Belleville and East St. Louis is very thickly settled. The schedules on the Belleville line include cars in each direction on fifteen-minute headway during the lighter hours of the day and nearly twice that service during the rush hours, at which time two-car multiple-unit trains are frequently operated. On Sunday cars are operated on five-minute headway. All trains make the 15-mile run in fifty-five minutes. The cars operated on the Belleville line are equipped with type M control, Tomlinson automatic couplers and National emergency air brakes. Two-car trains are operated by one motorman and two conductors.

The passenger service on the Lebanon line, which is 22 miles long, is operated in and out of East St. Louis on hourly headway with night and morning tripper service.

Edwardsville, it will be noted by reference to the map, is reached by either of two lines owned by this company, and cars are operated between East St. Louis and Edwardsville around the loop, which is approximately 42 miles long. Hourly service is given in each direction on the Edwardsville loop and also on the 27-mile line to Alton. A section of the St. Louis-Alton line south of Granite City is double-tracked.

**East St. Louis & Suburban—Two-Car Train as Operated on Alton Division**

The rates for special-car service are computed on the basis of 75 cents per car mile. The schedules for special cars on suburban lines represent, in so far as possible, the time of regular cars. Special-car service comes under the supervision of the passenger traffic department working in conjunction with the transportation department.

FREIGHT SERVICE

Railroad connections are had at East St. Louis with all the steam roads included in the St. Louis Terminal Railway Association and with the Southern Railway. A regular interchange with steam roads for receipt and delivery of carload business is maintained through these connections. Industrial tracks connect with a number of manufacturing plants on the suburban and interurban lines.

The St. Louis & Belleville division has a terminal yard at Winstanley with fourteen tracks, each 1500 ft. long, and also a junction yard at the St. Louis & O'Fallon connection, with a capacity of seventy cars. About 4000 tons of coal per day are handled through these yards to the St. Louis steam connections. A large part of the coal is received from four mines on the Belleville line, which have a daily capacity of about 1500 tons each, and from two large mines on the Lebanon line.

The electric railway's average revenue per ton of coal is approximately 32 cents. Coal is handled in 80,000-lb. capac-

**East St. Louis & Suburban—Work Car on Interurban Line**

ity cars, nearly 900 of which are owned and kept regularly in service on the electric freight lines and the connecting Terminal Railway Association lines. Normally the East St. Louis & Suburban Railway is the third largest coal carrier into St. Louis and is exceeded only in amount of coal delivered to the St. Louis Terminal Railway by the Illinois Central Railroad and the St. Louis, Troy & Eastern Railway, which are both steam roads with several lines serving the Belleville and Collinsville coal districts. During the winter of 1911-12, however, the electric road ranked first in amount of coal.

MERCHANDISE HANDLING

The Interurban Express Company, a separate corporation controlled by Belleville merchants, operates the light freight and express business over this road. The privilege is contracted for on the basis of the gross receipts and the railway furnishes the cars and the motormen. All express cars, of which there are four, are of 50,000-lb. capacity each, and these are always run as "extras."

JOINT STEAM OPERATION

The Lebanon division connects with the East St. Louis & Belleville line at Edgemont. The distance from Edgemont to Lebanon is 18 miles. Two miles of track on this line just east of Edgemont are used jointly by the cars of the Suburban railway and by the steam-drawn coal trains of this road and those of the St. Louis & O'Fallon Railway. This 2-mile section of track is through a deep waterway leading from the river bottoms to the prairies surmounting the high bluffs parallel with the Mississippi River. As this section of track carries such a varied service, including the

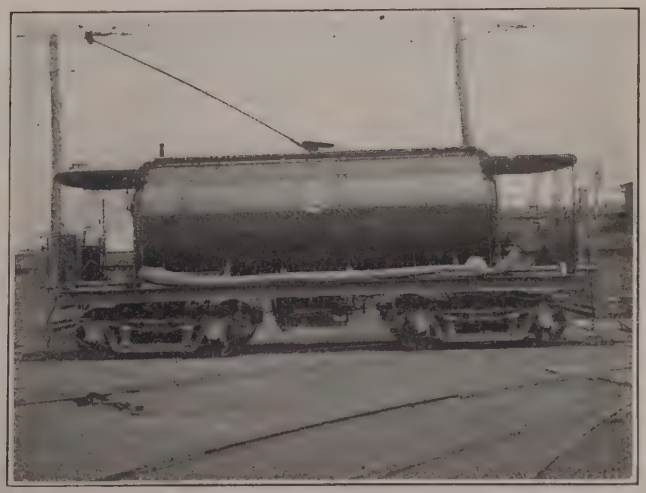
**East St. Louis & Suburban—50-Ton Freight Locomotive**

electric passenger service and steam-drawn coal trains of both companies, operators are placed at the junctions at both ends. All trains of both railroads stop at the operating stations at each end of the joint track section and obtain train orders or clearance cards.

OPERATIONS OF TRAINS

All the train service on the interurban lines is dispatched from a central office in East St. Louis. Two working dispatchers and a chief dispatcher are on duty during the day and two night dispatchers serve as relief. The dispatchers' equipment includes a newly installed double-face cordless Western Electric switchboard placed in the middle of the dispatchers' table between the two men and so wired that either dispatcher may receive calls from any incoming line. The operating mechanism of a Blake dispatcher's signal equipment is installed at one end of the dispatchers' table. The chief dispatcher, who is on duty during the daytime, serves as trainmaster.

Instruction schools are held throughout the year and all trainmen are required to pass examinations on rules and regulations, being quizzed by the chief dispatcher and divi-



**East St. Louis & Suburban—Sprinkler Used in East St. Louis**

sion superintendents. The operating rules are almost identical with the A. R. A. railway code.

The suburban lines of this road were among the first to be equipped with the Blake dispatcher's signals. Twenty signals are in use and all are under the control of the dis-

patchers located at East St. Louis. These signals assist the operation of cars on more than 100 miles of track, and it is stated that all signals are regularly operated, and yet the failures average less than one per month.

SHOPS

The general repair shops for the entire system are close to the main power station at East St. Louis. These shops have recently been provided with modern facilities for the maintenance of city and interurban equipment. Car bodies are handled by air hoists and by chain blocks supported from 10-in. I-beam runways. A system of hoists and runways provides for moving machinery from the inspection pits to the machine shops.

Some of the interesting practices at these shops follow:

Interurban car wheels, after having been turned down to the limit for safe high-speed operation, are fitted for use under heavy city cars.

All the brakeshoes have been standardized to three patterns and an average mileage of 8672 miles is obtained.

**East St. Louis & Suburban—Double-Truck Express Car**

The thermit and electric welding processes have been used with success for repairing motor cars and other heavy steel parts.

A saving of from 50 gal. to 80 gal. of oil per month is obtained by cleaning all waste.

The cost of oil for motor lubrication on city cars has been reduced from 84 cents to 22 cents per 1000 miles by the use of a special oil cup made at the repair shops. This oil cup is 2½ in. square and made of cast iron to fit the interior of the oil well on the motor. A hole drilled through the center of the bottom of the cup is plugged with a brass ring, through which is passed a brass rod resting on the journal and extending upward through the oil cup. The fit between this rod and the brass collar in the bottom of the oil cup allows for 0.004 in. play. This loose fit is just enough to prevent leakage when the car is standing still and yet will feed about the right amount of oil for a city car when it is moving. A pocket in the bottom of the cup prevents sediment in the oil well from clogging the opening. The upper part of the cup is fitted with a depressed cover having one hole through which oil can be poured. The depression in the cover is packed with waste to offer an obstruction to dust and to keep the oil from slopping out of the cup.

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In last week's issue of the *Electrical World* is a description by Charles R. Moore of the direct-reading dynamometer which is capable of indicating torque speed and horse-power of a revolving mechanism without the necessity for calculations. The machine is introduced between two shafts, of which one is transmitting power to the other and gives electrical readings covering the power transmitted. The instrument consists of a pair of alternators flexibly connected through a heavy spring, the distortion of which changes the phase relations of the two alternators and, in consequence, also the voltage developed by them. Power can be read direct from a voltmeter properly graduated, as the voltage is directly proportional to the speed at which the machines revolve.

## PUBLIC UTILITIES COMMISSION'S ORDER ON T-RAILS IN NEW HAVEN

On Aug. 2 the Public Utilities Commission of Connecticut ordered that T-rail instead of grooved rail be used for a relocation of the tracks of the Connecticut Company on Grand Avenue in the city of New Haven. Grand Avenue is a much-used street, having a width of about 40 ft. between curbs, on which the present street railway tracks are of T-rail. The street is paved with brick, which is badly worn and broken down.

The decision was the result of a rehearing held on June 26, and reported in the Electric Railway Journal of July 6, page 28, on a petition made by the Connecticut Company appealing from a condition imposed by the Mayor and Board of Aldermen of the city of New Haven to the effect that grooved rail must be used for a proposed relocation of the street railway tracks from Mill River to Quinnipiac Avenue on the street in question. At the rehearing much technical testimony was presented on the relative advantages of T-rail and grooved rail, evidence being given in favor of both types. The preponderance of the evidence appeared to be in favor of the T-rail, always provided, however, that proper paving was laid and maintained. The commission quoted from its decision on a similar point at issue in the city of Norwalk, in which it was stated that while most of the large cities in the East have some kind of a girder rail, many of the Western cities have adopted the T-rail, the designation of the best type for any particular street or locality being largely an operating and engineering question influenced by the surface or pavement of the street, its width, grade and character of travel. It was also stated in this decision that the use of modern permanent pavements, such as vitrified brick or wood block, had removed much of the opposition which municipalities and vehicular traffic generally have had to the T-rail and that automobiles and other rubber-tired vehicles experienced very litt'e difficulty on the highways from either type provided the street is properly paved. In a narrow city street where there is heavy and constant travel it was believed that the grooved rail might have advantages over the T-rail. A portion of the commission's conclusions in the Norwalk case was quoted as follows:

"There are undoubtedly decided operating advantages to the company in the use of the T-rail, and while there has been more or less of a demand by municipalities for the grooved rail, due largely to poor paving, there is, in our opinion, a growing tendency on the part of municipalities generally, and engineers in particular, to favor the heavy T-rail with brick or preferably wood-block pavements."

In its decision on the New Haven case the commission says in part:

"From such evidence as this commission has been able to obtain, it is of opinion that the T-rail is safer and better than the grooved rail for street railway operation and for the comfort, convenience and safety of its patrons, but it is not satisfied that the T-rail is as safe or convenient for steel-tired wagons, especially those of the lighter type. For pedestrians and also for automobiles and other rubber-tired vehicles, the particular type of rail makes no material difference.

"The weight of evidence of the engineering authorities, both railway and municipal engineers, produced at the hearing was in favor of the T-rail. Based upon such evidence and taking into consideration the width and location of Grand Avenue and the character and volume of travel over the same, this commission, after careful consideration, is of opinion that the advantages of the T-rail outweigh the disadvantages claimed for steel-tired vehicles as applicable to said Grand Avenue."

For the case under consideration the commission therefore ordered the use of 7-in., 95-lb. T-rail of the Pennsylvania Steel Company's section No. 272.

# Convention of International Association

**This Convention of the International Street & Interurban Railway Association Was Held in Christiania, Norway, July 1-5—Abstracts of Seven Papers Are Published**

The seventeenth biennial convention of the International Street & Interurban Railway Association, which includes most of the street and interurban railway lines on the Continent of Europe and a few of the lines in England, was held at Christiania, Norway, July 1-5.

Three of the reports presented at this convention have already been published in this paper, viz.: "The Influence of Electric Railways in the Development of Large Cities, and Their Social Aspects," by M. L. Dausset, comptroller of the city of Paris and past-president of the City Council, ELECTRIC RAILWAY JOURNAL, Aug. 3, 1912, page 175; "Report on Rail Corrugation," by Arthur Busse, chief engineer of way Grosse Berliner Strassenbahn, ELECTRIC RAILWAY JOURNAL, Aug. 10, page 215, and "Self-Propelled Cars," by E. A. Ziffer, president of the Bukowina Railway, Austria, ELECTRIC RAILWAY JOURNAL, Aug. 24, page 283. Abstracts from a number of the other papers follow:

### INFLUENCE OF LOCAL TRANSPORTATION UPON URBAN DEVELOPMENT

A report on this subject was made by Dr. Kühles, member of the Municipal Council of Munich, and was founded largely on his experiences in that city. His conclusions were to the effect that privately owned railway enterprises have the advantage that their regular development is not influenced by outside interests and speculation of various kinds by those interested in taking advantage of the city development. They present, however, the danger that a desire for profits often leads them to discourage suburban development in order to reduce the length of haul. Municipal transportation possesses the disadvantage that those called upon to decide on its merits are sometimes influenced by private interests. The general expansion of the railway system, in consequence, often exceeds the natural development of the city, and it follows that municipal transportation is not a factor which is favorable to the best economic location of dwellings but aids speculation and obstructs construction.

Dr. Kühles proposed two plans of organization to remedy the faults of either of the systems:

First, that all lines established in sparsely settled districts where local traffic is light or altogether lacking should be carried out with the assistance of property owners who are interested. This could take the shape of a guarantee, based upon the cost of operation. The alternate plan, when the municipal operation is likely to produce unfavorable results in traffic and city development or else gives indication of unprofitable working, or, finally, when it is desirable that the town should have a decided voice in the railway management, proposes that all of the transportation enterprises should be united in a central organization in which private capital represents 51 per cent of the holdings.

The author pointed out the inadvisability of permitting fares charged to passengers to go below the net cost of operation, no matter whether private ownership, or municipal ownership, or a combination of the two, is in force. He also stated that since the price of building construction and that of land, in addition to street railway fares, all exert an influence on the cost of dwellings, there should be means of introducing some factor other than that of the cost of the transportation in order to reduce the cost of habitation, and that the most important regulation appeared to be one limiting the density of population and adapting itself automatically with the progressive extension of the most dense zone of construction into other zones.

### RELATIONS OF STREET AND INTERURBAN RAILWAYS

A paper was presented by M. Campiglio, president of the Light Railways & Tramways Union, of Milan, upon the interchange of cars between main line railways and city or other lines which served as feeders, as opposed to the transfer or transshipment of freight. The author had submitted to eighty-eight railway companies a series of questions based on the following three assumptions: first, that the rolling stock of the main line is interchangeable with that of the city line, or feeder; second, that the rolling stock of the main line runs over the city line without transshipment of goods to the point of exchange, but that the rolling stock of the feeder line should not run on the main railway; third, that all goods are reloaded at the points of exchange, either because of the difference of gage or because of light rails on the city line.

The conclusions obtained from the replies received to the questions were to the effect that the system of exchange of rolling stock should be as simple as possible, preferably based on a per diem rate per car, and that a reciprocal free demurrage period should be allowed, which should be doubled for cars which are returned loaded, Sundays and holidays being excluded. The recommended charge per car was between 2 cents and 3 cents per hour. It was recommended that each line should charge its own rates for transportation on its own line, the switching costs being neglected unless the movement was exceptionally long, except that certain proportional transfer charges should be added when shipping cars from one line to the other. In the case of the feeder system, the cost of switching was to be supplemented by proportional charges covering the cost of handling, and the additional traffic brought by the feeder line to the main line should be taken into consideration in making up charges and establishing a basis for dealing with the secondary system.

Under the second assumption, where the rolling stock of the feeder system could not be used on the main line, the conclusions were similar to those of the first assumption, except that the demurrage time allowed to the main line should be equal to that permitted to consignees, and also that the per diem charge per car should be slightly reduced.

Under the third assumption, where reloading has to be done at points of interchange, the recommendations were the same as in the first case, with the addition that interchange of goods must be effected in the least possible time and that the demurrage charge be established at 3 cents per hour per car.

### LOCATION OF CARHOUSES

This report took up in detail the various influences affecting the location of carhouses and in some cases of repair shops. A large number of inquiries had been addressed to various railways on the subject, and more than 100 replies were received. Most of the replies considered that centralization was undesirable, although no general rules could be laid down owing to the influence of the size of the railway upon the question.

J. H. Neiszen, who presented the report, deprecated the importance given to empty mileage in running to carhouses and stated that features of more value were those of satisfactory lodging facilities for employees and of avoiding complaints caused by having a carhouse too close to private dwellings. In some large cities small electric locomotives are used for moving cars, especially where trailers are in use. This is the case with a great many of the railways which sent in replies.

SNOW REMOVAL

Treygve Poppe, the engineer-director of the Christiania Tramways, presented a report containing detailed descriptions and illustrations of appliances used for the removal of snow from surface railway tracks. It was evident in the replies received to questions upon this subject that regular snowfalls which are expected are cleared with comparative ease, only the occasional and abnormal snowfalls being a cause of serious trouble.

The author enumerated a large number of different demands made by street authorities upon railway companies and brought out clearly the wide differences existing in municipal ordinances covering the handling of snow. A number of different pieces of apparatus, ranging from small rotary brushes to the enormous cast-iron plow used in Copenhagen, were illustrated. The transportation of snow after it was piled was stated to be an exceedingly difficult matter under the conditions existing in European cities.

COLLECTION OF FARES

The report upon fare collection made by G. Lembourg, engineer-in-chief of the National Light Railway System of Belgium, was presented largely in the form of an album containing all of the sample tickets and folders which were received in answer to 155 replies to the questions submitted by the author. Mr. Lembourg stated that it was impossible to reach any definite conclusion from data obtainable, as the various railways differed so greatly with regard to operating conditions and local regulations.

HEATING AND LIGHTING CITY AND SUBURBAN RAILWAY CARS

The question of car lighting and heating has been before the congresses for several years and was again discussed by F. de La Hoye, engineer-in-chief of traction of the National Light Railways system of Belgium. The subject was treated under two heads, electric and steam traction. The author stated that the heating of passenger cars, whether for city or interurban service, has been found to have a distinctly beneficial result upon receipts. The degree of heating obtained varies generally between 41 deg. and 59 deg. Fahr. No complaints on hygienic grounds have been received as ventilation is provided by overhead louvers. Electric lighting is generally used, and on steam railways current is obtained either by a small battery for the whole train or by independent batteries on each car. The expense is in consequence so great that acetylene is advocated instead. The author gave the cost of various systems of heating and lighting for both electric services, but stated that the subject would bear much more investigation before any rules could be formulated.

EXPERIENCE WITH COMMUTATING-POLE MOTORS

One paper on this subject was read by Mr. Bacqueyrisse, chief engineer of tramway construction of the General Omnibus Company of Paris. He summed up the advantages of commutating-pole motors as follows:

(1) Sparkless commutation even on heavy overloads, which permits a considerable increase in the maximum output.

(2) The better maintenance of the commutator; it also heats less because of the reduced sparking.

(3) Longer life of the brushes.

(4) The lower saturation of the core increases the efficiency and capacity of the motor.

(5) Poor handling of the controller by the motorman is less injurious to the motor because it is possible for the motorman to accelerate rapidly without producing flashovers. This consideration is important in city service where rapid acceleration is desirable and on lines with steep grades.

(6) By the use of shunted fields a larger number of economical running positions of the controller is possible. This reduces the energy consumption.

(7) Electrical braking is made much more simple because the inconveniences accompanying the use of electrical braking with motors without interpoles practically disappear.

The advantages indicated above increase rapidly when the voltage is higher than 500.

Reports from different member companies show that most of them have some commutating-pole motors. One company has its entire system equipped with them. In most of these motors the number of interpoles is equal to the number of main poles. Eight companies use motors with two interpoles and four main poles. Four companies use motors of both types.

In further discussion of the subject Mr. Bacqueyrisse pointed out that for equal power the weight of a motor is less when it is equipped with commutating poles. The life of brushes according to reports seems to be increased 50 per cent. The reduction in energy due to the use of a shunted field is reported on some systems to reach 15 per cent. The shunted field control is particularly adapted to comparatively level lines where high speed is desired on the last point, and the increase in number of running points enables motormen to follow more favorably the grades and running conditions of the line. The average car consumption with interpole motors reported is 60 watt hours per metric ton kilometer (87½ watt hours per ton mile). Most of the companies report the saving as 5 per cent. Three believe it to be from 10 to 15 per cent. One company only reports an increase of repairs. Several companies have increased the number of braking points with their electrical brakes to five or six, and in some cases seven.

Dr. Eisig, the manager of the Municipal Tramways in Chemnitz, who also reported the subject of commutating-pole motors, differed from Mr. Bacqueyrisse on some points. He stated that, after considering a large number of replies from both non-German and German enterprises, he felt that the only advantages which could be considered to have been fully established are that the application of commutating poles permits a greater weakening of the field than in the case of ordinary motors and provides a greater variety of speeds between the limits. The maintenance of the commutator is materially reduced and the brushes have a longer life. The commutating poles also make it possible to utilize higher line potentials than those permitted with ordinary motors. Sparking is materially reduced and the motors afford greater security when used for braking.

All of the manufacturers with whom Dr. Eisig corresponded, except two, assented to these views. One of these two companies denied practically all the advantages of commutating poles, and the other considers them useless for voltages of 500 or 600.

SOCIAL AND BUSINESS FEATURES

The headquarters of the association during its meeting in Christiania was at the Commercial Club, and the technical sessions were held in the banquet hall of that organization. They were attended by prominent representatives of the Norwegian government and by official delegates from various European countries.

C. de Burlet, general manager of the National Light Railway System of Belgium, presided at the congress and succeeded, as president of the association, Baron Janssen, who for a number of years had served in that office but, owing to his numerous engagements, felt obliged to resign. Resolutions expressing the appreciation of the association of the past-presidents' services were unamimously passed.

During the week of the congress a number of visits were made in the neighborhood of Christiania to points of technical or scenic interest, and at the close of the sessions many of the delegates visited Bergen and a number continued as far north as North Cape.

The result of the annual election of officers for the ensuing two years was published on page 292 of the Electric Railway Journal for Aug. 24, 1912.

# Factors in Railway Electrification

Abstract of a Paper Read at the Turin International Electrical Congress—The Author Considers Particularly the Nature of "Peremptory" Factors and "Activity" Factors in Railway Electrification

The full text of the paper on the electrification of the steam railroads delivered Sept. 15, 1911, at the Turin International Electrical Congress before the electric traction section by C. O. Mailloux, chairman of the section, has just become available. A report of the proceedings of this convention was published on page 1146 of the Electric Railway Journal of Dec. 2, 1911.

Mr. Mailloux first referred to the spirited debates on the relative merits of the different systems of electrification which had characterized the discussion on this subject for several years. The advocates of some particular system, he said, are often exultant without the slightest reason when they see their favorite system adopted for some particular electrification, when, in reality, all the other systems were unavailable owing to particular complication or exceptional reasons. Thus, in the case of the tunnel electrification of the New York Central Railroad, New York, Mr. Wilgus, vice-president and chairman of the commission of engineers in charge of the work, stated that the selection of the direct-current system was practically unavoidable, first, because there was not enough room in the tunnels for an overhead contact line and, second, because the use of an overhead contact line of any sort in the city of New York was prohibited by law. On the other hand, in the case of the terminal electrification of the London, Brighton & South Coast Railway in London the direct current was unavailable for the reason that its use would have necessitated reconstruction of the stations and platforms and perhaps even modifications in the cars to make room for the third rail. Many other important cases could be cited, the speaker said, where the so-called "selection" of system was not a matter of choice but of fate, determined by arbitrary conditions. The speaker uses the term "peremptory factors" to designate these arbitrary elements which always enter, either in one way or in another, in every electrification problem.

### PEREMPTORY FACTORS

A "peremptory" factor is a fact or condition which imposes itself arbitrarily upon the engineer and admits of no discussion whatever. It not only must be reckoned with, but it may take precedence over other important considerations and make them secondary in importance. It is, in a sense, a quantity which, for a given case, takes a fixed value, i. e., a value in which it is difficult or impossible to cause a change. These factors are, so to speak, the constants of an electrification problem. Several may be expected in every case, and they may differ greatly in importance or relative value.

The problem of electrification may be divided into four cases—first, the cases where electrification is not feasible; second, the cases where it is doubtful; third, the cases where it may be feasible, and fourth, the cases where it is unavoidable, that is, where it either forces itself or else is forced upon the railroad company. In the first two kinds of cases—that is, the non-feasible and the doubtful kinds—the objections are always, in reality, of financial character, inasmuch as the obstacles and difficulties which are of purely physical character, such as constructional difficulties, can usually be overcome if the necessary funds are available.

In the third kind of cases (the "feasible" kind) it is the question of financial return which overshadows all others. The choice of system might, possibly, influence the degree of feasibility. This means that a particular system may have certain advantages in a given case without being, however, the only one that is practical for that case. In the fourth kind of cases ("unavoidable" or "forced" electrification) financial efficiency is no longer the foremost consideration; it is not the principal "peremptory" factor. The preponderating reasons then are: First, the absolute necessity of making the movement of traffic more active or of increasing the traffic capacity of the track (i. e., increasing the total amount of transportation over it) either at certain places only or else over the entire line, to remedy congested or choked-up traffic conditions; second, service conditions of a kind which electric traction alone can fulfil properly, such as obtain in tunnels, in underground lines, etc., especially in large centers; third, restrictions or limitations, as to the kind of motive power allowable, in the form of ordinances or decrees promulgated by public authorities, which formally compel the adoption of electric traction, either to promote the comfort or safety of passengers or for other logical or even arbitrary reason. Even in the case of "unavoidable" electrification, however, the management of the railroad company will not lose sight of the financial side of the question. It will surely want to know how this thing is going to "work out" in the end, financially. The principal object of any railroad enterprise, that at which it aims directly and of which it must never lose sight, is the profit of that enterprise, and which has to be made out of it, in order that the capital investment may yield a satisfactory return for the shareholders and bondholders.

### FORMULA FOR CALCULATING RATE OF RETURN

The speaker then referred to a paper presented by him at the International Electrical Congress at Marseilles in 1908 on the manner of making engineering and financial investigations and reports on electrical projects in America. (See also Proceedings of New York Railroad Club, Vol. XX, No. 5, and Electric Railway Journal March 26, 1910, page 551.) He called attention to a formula proposed by him, which is as follows:

$$\frac{R-E}{C} \times 100 = F$$

In this equation

$R$ = total annual receipts (gross revenue);

$E$ = total annual expenses (total operating expenses);

$C$ = total capital investment (capitalization);

$F$ = a factor representing the total rate of return or the rate at which the enterprise as a whole makes or loses money.

This formula was elaborated by Mr. Mailloux, who showed that each of the quantities $R$, $E$ and $C$ could be subdivided into quantities representing different classes of receipts, expenses and capital.

### ACTIVITY FACTORS

The speaker then discussed the relation of volume and density of track to desirability of electrification and said that in a great many cases electrification would still be made in the doubtful or non-feasible class in spite of the very large volume or very large density of traffic. In fact, statistics of traffic volume and density are useful only to denote and measure factors of much greater importance—sometimes of peremptory importance—that is, the "activity" factors. To explain this term, the speaker said that the activity of an electric generating station is expressed by the load factor, and that similar factors could be used to measure the relative activity of the motive power, rolling stock, track, the line as a whole and the traffic. All confusion with load-factors will be avoided by calling these new factors "activity factors" or else "utilization factors." For each activity factor it is possible to fix upon a certain maximum "activity" which is theoretically attainable—just

as is done for the load factor of a power station and which will correspond to the maximum value of the factor, namely, the value to be taken as equal to unity or to 100 per cent. A 100 per cent traffic factor would mean that the movement of trains was kept at the highest possible point of activity all over the line for twenty-four hours.

The theoretical maximum traffic will naturally be less on a single-track line than on a double-track line, where the trains can run in both directions without obstructing each other and without loss of time. On a single-track line the track may be very busy—that is to say, its activity factor may be very high—and yet the total volume of traffic may not be large relatively. It is not, therefore, the total volume of traffic or its density; it is rather the "intensity" or "rate of operation" that will be of interest whenever a comparison is made between the facilities of various lines for their traffic. It is usually very difficult to compare the results obtained on lines of different character, but when once their activity factors are determined it becomes possible and quite easy to make a useful comparison between all sorts of lines.

There is reason to believe that the activity factors will vary greatly, according to the operative features and conditions of the roads, and the variation of these factors may in many cases bring to light the reasons which prevent electrification or which insure its success, according to the case.

### ACTIVITY OF TRACK

An activity factor can be applied to each part of the line, and as the track always represents a considerable proportion of the total capital investment an economic purpose is usually served by increasing the activity factor of the track. This is one great advantage of electric traction. On the other hand, where traffic is lacking other means may be profitably adopted before electrification is attempted. An example of the activity factor of the track upon electrification is shown in the case of the interurban lines and steam railroads in the Central States. For many years the steam railroads made an effort to increase their freight business even at the expense of their passenger business, and in many sections of the United States interurban lines paralleling the steam railroads were constructed, especially in Pennsylvania, Ohio, Indiana and Illinois. Considered from a transportation standpoint, these interurban lines are additional tracks to those built by the steam railroads, and by reducing relatively the track activity factor of the steam railroad tracks they have postponed the electrification of the latter. On the other hand, on those roads where the passenger receipts are a greater proportion of the total receipts the opportunities for electrification become more apparent.

Thus, the Long Island Railroad in 1910 was the tenth highest among the steam roads in gross receipts per mile of road per year, its gross receipts being $28,873 per mile, but out of the twenty-two lines having the highest revenues it is the only one whose traffic comprises more passenger miles than ton miles of freight, about four and a half times as much. On the other twenty-one systems there are always more ton miles than passenger miles, from two to over sixty-five times as much, and the average, for the twenty-one roads, is about seventeen times more. On looking further among the railroads whose gross receipts are not quite so high, one other road, and only one other, will be found in a similar position, namely, the West Jersey & Seashore Railroad, and it is interesting to note that this road, which is likewise controlled by the Pennsylvania Railroad Company, is also partly electrified. This road (356 miles of line, 494 miles of track) is also among the best American roads, even though its gross receipts are lower than those of the Long Island Railroad. Its gross revenue in 1910 was $15,568 per mile of road per year, which made it rank the thirty-third in a total of 39,280 miles of American railroads. It ranked higher than several large systems which are known all over the world, such as, for example, the Union Pacific, which ranked the thirty-eighth; the Northern Pacific, which was the forty-third; the Southern Pacific, which was the forty-fourth, etc. The traffic statistics for the West Jersey & Seashore Railroad showed over three times as many "passenger miles" as "ton miles."

### PARTIAL AND COMPLETE ELECTRIFICATIONS

It is known to be on account of great passenger traffic that large terminal electrifications have become and are becoming "unavoidable." The mistake has often been made of thinking that the electrification of a terminal was bound to lead, necessarily and quickly, to the electrification of the entire system. In reality, everything will depend upon the track activity which is necessary on the different parts of the system. It is evident that if the traffic and service conditions are the same from one end of the road to the other, the electrification, whenever it becomes necessary on a portion of the line, will also at the same time become necessary all over the line. In Europe, where the lines are shorter and where the service conditions do not vary much on the different portions of the same line, it is fair to expect before long to see lines which are electrified completely from one end to the other. In America, where the "big" roads are much longer relatively, and where the conditions often vary greatly—in some cases enormously—on different portions of the same line, electrification may be perfectly "feasible" on a portion of the line and absolutely "impossible" on the rest of the line.

As a rule, a terminal electrification in a large city such as New York, London, Paris, etc., will always involve and comprise the electrification at the same time of a more or less extended "suburban zone." In fact, it is mainly the enormous stream of people who are traveling all the time and at all hours between a great city and its suburbs which overloads with trains the in-bound and out-bound tracks at the great terminal stations and renders necessary such a high activity in the motive power and the track in the suburban zone. Beyond a certain distance from the terminus the suburban trains become less frequent and they cause less hindrance to the "through" trains. There may be further away along the main line some cities of a certain importance which have also their "suburban zones" in which there is a local rise in activity. Without this there would be nothing but the through traffic to utilize the track and keep up its activity in the intermediate portions of the line. If this through traffic is itself so large that it requires a high activity of motive power and track, electrification may be "feasible" in the middle portions quite as much as at the ends of the line. It will be especially attractive whenever it does away with the necessity of constructing an additional track over a considerable portion of the road.

In certain cases the complete electrification of a road, even though it should cost more and pay less at first than partial electrification, may, nevertheless, be advisable, on account of the possibility of a large increase in revenues which would warrant it, and pay the cost of it, after a time.

It is evident that a line which is electrified at the outset, while it is being constructed, as, for example, the line through the Simplon Tunnel between Switzerland and Italy, will have a great advantage in comparison with an existing line already equipped for steam traction which is to be electrified—as, for example, the Mount Cenis line between France and Italy. The former would have no equipment to discard and no changes to make anywhere to prepare for electrification. The latter, on the contrary, would have to anticipate, first, a considerable loss of value in the discarded equipment; second, considerable expense for reconstruction and changes. The result will be, therefore, that in electrifying a road already equipped for steam traction the capital involved, as represented by $C$ in the formula quoted, will be relatively greater than for the electrification of a new line of the same size and character.

### RELATIVE COST OF DIFFERENT PARTS OF EQUIPMENT

Another factor to be considered is the relative cost of the different parts of the electrical equipment. The cost of

line equipment is independent of the activity of the track, being proportional to the miles of track, and, contrary to what is popularly supposed, for a large steam road often costs much more than the rest of the outfit. On the other hand, the cost of the rolling stock is in direct relation to the activity of the track. As an instance of the relation of the cost of these two parts of the equipment Mr. Mailloux cited the terminal electrification of the New York Central Railroad in New York, upon which about $15,000,000 at present has been expended. About one-third of this amount is for the power plant and distribution system which is not yet fully utilized, leaving about $10,000,000 as the cost of the equipment needed for present service. Of this, only about $1,600,000, or about one-sixth, is represented by the electric locomotives, which are forty-seven in number and cost on an average $34,000 each. Again, in an estimate made by Thomas Conway, Jr., of Philadelphia, in the March, 1907, issue of the *Annals of the Academy of Political and Social Science*, based upon statistics given by Messrs. Stillwell and Putnam on the cost of electrifying all railroads of the United States, the following figures appear:

| | |
|---|---|
| Contact line | $1,084,870,000 |
| Track bonding | 108,487,000 |
| Generating plants | 400,000,000 |
| Distribution systems | 220,000,000 |
| Total | $1,813,357,000 |

Mr. Mailloux continued that while the results would be more definite if all "doubtful" or "non-feasible" cases of electrification had been excluded, the figures are interesting because they bring out the relativity of the initial costs of the various portions of equipment as follows:

| | Per Cent. |
|---|---|
| Contact line | 45 |
| Track bonding | 5 |
| Substations, etc. | 9 |
| Generating stations, etc. | 17 |
| Locomotives | 24 |
| Total | 100 |

Thus, if the distribution system (substations, etc.) is included in the electrical equipment of the track, the equipment would amount to 59 per cent and the locomotives to only 24 per cent of the total cost. This indicates that in the selection of a system of electric traction the line equipment deserves even more careful consideration than the motor.

The frequency may also influence the choice between direct-current and alternating-current systems in certain cases in America. The standard commercial frequency for all large power plants which sell electrical energy in America is 60 cycles per second because this frequency enables the same distribution system to supply current for both light and power, but as the frequency of 60 cycles would be too high for single-phase work, rotating apparatus would have to be introduced at the substations for single-phase roads which purchase their supply of electric power from central stations, and this point has had considerable weight in favor of the direct-current system. This example is mentioned to show the influence of peculiar and exceptional conditions which affect more or less arbitrarily or "peremptorily" a choice which it is often thought can be made without restriction or constraint.

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The annual report of the Leeds (England) tramway committee reviews the operation of the system for the last ten years in addition to giving statistics for the past year. The total receipts during the ten years covered were $16,008,206; operating expenses amounted to approximately 51.3 per cent, leaving a total gross profit of $7,784,702. Of this $1,658,674 was applied to interest charges, $1,775,443 to repayment of borrowed money, $994,567 in renewals of permanent way, and $278,155 for income tax and similar charges. The surplus profit applied to the relief of city taxes during the ten years was $3,077,863.

## APPORTIONMENT OF MAINTENANCE OF WAY EXPENSE BY WISCONSIN COMMISSION

In the abstract of the decision of the Railroad Commission of Wisconsin in the Milwaukee fare case published in last week's issue of the ELECTRIC RAILWAY JOURNAL a description was given of the method finally adopted for the apportionment of expenditures for maintenance of way between The Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company. The method was based upon a memorandum prepared by W. D. Pence, engineer of the commission. In his study of this subject Mr. Pence said:

"The following statement regarding the apportionment of maintenance of way expenditures presents in brief form opinions and conclusions reached in the light of detailed field examinations of the entire Milwaukee traction properties, city and interurban, and of a review of all available records and data in the company's office. Familiarity with these properties was gained in the course of successive valuations and revaluations made by the engineering staff for the purpose of the Railroad and Tax Commissions. These examinations were first undertaken in 1907 (January to July) when the initial valuation of these properties was made and were further extended in the subsequent successive annual revisions. The matter of apportionment of maintenance of way expenses was early presented to the engineering staff, and the subject received particular attention in connection with the exhaustive review of the valuations of the entire physical properties made under special instructions for the purposes of this case during the years 1910 and 1911.

"The apportionment of maintenance expenditures as between the city and interurban traction properties was first presented as a call to review the company's practice of keeping these costs in common and subsequently apportioning the figures between the two properties on a car-hour basis. The point was raised at the outset as to why there should be any necessity of pursuing such indirect process when direct localizations of material and labor costs could readily have been made. Although the advantages of such localization were obvious, the accounts had not in fact been handled on that basis and the matter presented itself directly as a practical problem as to whether the car-hour basis gave results which were suitable and equitable for the purposes of the present case.

"The analysis of the operating statistics on the company's books for the calendar year 1909, derived on the car-hour basis, showed approximately 85 per cent of the maintenance of way and structures expenses assigned to the city property. After a somewhat careful examination of the various aspects of the matter a preliminary or tentative opinion was reached that the maintenance of way expenditures to be apportioned to the city traction property could not properly be taken at so high a percentage as that above named. As a further step in the course of the preliminary survey of the problem some consideration was given to fixing at least roughly a lower or minimum limit, and it appeared that the proportion of those expenses assignable to the city property could not in any event fall below its percentage of single-track mileage, namely, about 40 per cent. This rapid, though somewhat careful, preliminary survey of the problem led to the belief that had the maintenance of way accounts actually been kept on a localized basis the share associated with the city system would have fallen somewhere within the roughly stated limits of 40 and 85 per cent of the total.

"From this preliminary inquiry came the suggestion that an attempt be made to localize the maintenance expenditures for an entire year, and this task was undertaken for the calendar year 1909. It was found practicable to identify with certainty about two-thirds of the aggregate expendi-

tures for the year and to associate in detail that proportion of the labor and material items with the respective properties. This separation showed that somewhat more than one-half (52.40 per cent) of the total for the year then under review would have been charged to the city system had the roadway accounts been kept on the localized plan.

"In the light of these preliminary investigations it appeared that the car-hour basis of apportioning the maintenance of way expenditures was unsatisfactory, and steps were taken to establish a method or basis for making these divisions which would meet the present requirements. These further investigations were carried forward more or less independently by the engineering and statistical departments of the commission's staff with conferences on particular points which arose from time to time.

"In the course of these discussions there has been occasion to review, and in some measure to apply, the results of somewhat similar studies carried on in 1906-07 in connection with the Wisconsin passenger rate cases, in which the commission found it necessary to consider the relative effects upon track used in common freight and passenger business due to the high-speed passenger trains and the slow-moving tonnage trains, with the further requirement for each class of traffic of making a separation of the maintenance of way and other operating expenses as between intrastate and interstate business. Without going far into detail as to the conclusions then reached, attention may be drawn to the fact that the conditions presented in the two cases differ materially along certain lines.

"In the present case, for example, there are lacking the sharp contrasts as to train units found on the steam roads. In fact, on the particular traction properties now under consideration there is lacking altogether the freight or express business which has become so important a factor in the traffic of traction properties in general, particularly in other states. In the present case the contrast of conditions in the two properties as affecting the operating expenditures in the maintenance of way group centers chiefly in the differences in type of roadway and track construction in the city streets and in the country and in the methods of current upkeep for the two types of road. There is also a variation due to differences of speeds and of car weights on the two properties. Within the city limits on routes or streets used by interurban runs in reaching the downtown terminal a distinction may be made with reference to the difference in weights of cars used in the two kinds of service, although this contrast is growing less as the proportion of the newer type of heavy city cars increases. In this same connection there must be taken into account the added wear due to the fact that the city cars on these lines used in common are required to stop more frequently to meet the demands of the local city business.

"In the steam road maintenance apportionments above referred to a separation was first made, on the one hand, with regard to the influence of such natural elements as weather, decay, etc.—namely, elements whose effect may be taken to be entirely independent of the traffic—and, on the other hand, to those causes associated with wear and tear or the mechanical attack more or less directly traceable to the action of the traffic. The advantages gained in the earlier cases referred to from a preliminary separation under these two general heads led to the adoption of the same method or expedient in the present case in subdividing such maintenance of way items as may best yield to this treatment; and where this basis was used the fraction associated with 'wear' was then apportioned between the two properties on a car-mile or traffic basis, and the non-traffic or 'weather' fraction of the particular group or item on a track-mile basis. Other items of expense, when best apportioned on another basis, were treated with special regard to known physical conditions or to facts revealed by examination of the accounts or other data available for the term of years considered. The results of such apportionments for the various accounts are set forth in the table published in the Electric Railway Journal of Aug. 31, page 319. Although there were incidental or minor differences of opinion with regard to certain of the items, the conclusions reached from an engineering viewpoint were substantially in accord with the figures derived from other sources. The following comments touch upon the more important of the items apportioned:

"Ballast was made a direct charge to the Milwaukee Light, Heat & Traction Company, in the light of evidence gathered from the localization of expenditures within the period considered, the general observation being that relatively little ballast in the ordinary sense of the term was being applied on the city lines during that interval. The assignment of about one-third (33 per cent) of the tie renewals of the two properties to the element of wear, depending more or less directly upon the attack of traffic as distinguished from the ravages of decay, was made in the light of extended field observations of ties freshly removed from the track on both the city and country lines; and this figure is also in line with the judgment reached in the 1907 passenger rate cases. The renewal of rails and joints, special work, etc., was apportioned almost wholly (90 per cent) on a car-mile basis. Roadway and track labor, labor on paving and paving materials, accounts 7, 8 and 9 respectively, were separated between the two properties by direct percentages which were derived through a study of actual localizations covering a proportion of each item sufficiently large to justify this method. Cleaning and sanding track was taken as depending wholly on a traffic basis. The expense of removing snow and ice, while normally resting on a track-mileage relationship, was assigned in part on a car-mile basis in recognition of the expediency of prompt removal of snow in the city, due to the necessity of securing prompt service during or following heavy snowstorms.

"Accounts Nos. 14 and 15, labor and material on bridges, culverts, etc., were charged 15 per cent on a traffic basis as against 10 per cent so charged in the steam road separation. The maintenance of overhead transmission system and overhead distribution system has been divided on a basis of 10 per cent upon the car mile and 90 per cent on a mile of track basis, having in mind the estimated proportion of expense fairly assignable because of wear and weather conditions respectively. The items relating to the upkeep of the underground systems were assigned substantially on the basis of the respective inventory values of the two properties, which substantially agreed with such localizations as could be made. A similar basis was taken for the apportionment of maintenance of buildings, fixtures and grounds.

"The minor variations of opinion with reference to individual separations but slightly affected the resulting final apportionment figures, and there was substantial agreement in the figures representing the composite judgments of those engaged in these studies regarding the apportionments of the various items of maintenance of way expenditures. Since these opinions were reached throughout by a special study of the special circumstances of this case, it is unnecessary to add the statement that the figures arrived at are applicable only to this property and under the conditions surrounding the operation of the same during the period considered. The necessity of making these apportionments arose from the lack of an actual separation based upon a system of localized accounts extending through the period of operation covered by this case."

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The tramways committee of the Edinburgh Town Council is considering a proposal made by the city engineer that experiments should be undertaken with the type of self-propelled straight gasoline tramway car which is being used between Morecambe and Heysham. The city engineer has also been making inquiries into the gasoline-electric mechanism.

# Efficiency in Equipment Maintenance

The Writer Shows How the Car Maintenance Efficiency of a Large Railway System Has Been Improved by Concentration and the Adoption of the Mileage System

BY J. C. THIRLWALL, SHOP FOREMAN BROOKLYN RAPID TRANSIT SYSTEM

Louis D. Brandeis, the well-known lawyer and publicist, aroused considerable interest both among the railway fraternity and the general public by some remarks made by him last year before the Interstate Commerce Commission on the decrease in railway costs that greater efficiency of operation and of maintenance would render possible. It will be recalled that he asserted that the railways of this country could save $1,000,000 a day if their work was properly systematized, and if the time now wasted in unscientific and inefficient methods of work was eliminated. The newspapers informed us that a number of railway heads asked him to "Come out and show us how this can be done," offering at the same time large pecuniary inducements, but the invitation was not accepted, possibly owing to the fact that it is much easier to tell another man that he is doing a thing the wrong way than to show him the right way. However, leaving Mr. Brandeis' abilities and the accuracy of his figures to one side, what he said, while probably new to the newspaper public, merely gave publicity to what every progressive railway official has felt for years, that only by increasing the efficiency of the different departments of the service and through the elimination of lost motion and faulty methods could be offset the tremendous increase in operating expenses that has been entailed by higher priced materials, constantly increasing wage schedules and the demands of the traveling public for larger and more luxurious cars, faster timetables and the increased use of safety appliances.

A wonderful increase in efficiency has unquestionably been made in the past decade, but it is certain that much more remains to be done. It may therefore be of interest to electric railway men, and possibly to some of our steam brethren as well, to point out the steps taken by one of our largest electric systems toward simplifying and systematizing the work of its mechanical department, and to call attention to some of the results obtained since the inauguration of this policy.

The figures and data in the following paragraphs are based on actual results obtained by a road handling an exceptionally large number of both city and interurban types of cars. None of its equipment has been in service for less than four years and much of it for more than ten years. It has a wide diversity of trucks, car bodies, motors and control equipments—a condition which increased the difficulty of obtaining maximum of efficiency in their maintenance. In spite of this, such strikingly successful results have been obtained in the reduction both of costs and of operating defects that an analysis of the company's methods and system of organization will well repay careful study by other railways which desire to get the best results from their rolling stock at the lowest expense.

The writer has been in close personal touch with the work done during the past ten years and has had exceptional opportunities for observing and comparing its methods with those of other systems in various parts of the country.

## NIGHT AND DAY INSPECTION

To this day there are numerous electric railways in all parts of this country which have no regular, systematized method of car inspection. Possibly most electric roads, viewing the question from the standpoint that a car is earning its cost only when running in service and that all time spent over the pits or on the jack-up is money lost to the company, send a car out to run until a report of "poor brakes," "motor trouble" or "controller trouble" compels a "lay-up." Some roads will then go over the car in a more or less perfunctory manner, some will repair only the defect reported, and with the loss of the least time possible, the car is again started out to continue till another defect brings it back. Ten years ago this was almost the universal practice, with perhaps a few exceptions where a night force was supposed to look over the apparatus on all cars laid up, wherever they happened to be, in yards, carhouses, or over pits. Night inspection was unquestionably better than nothing, but for many reasons, some of which will be touched on later, this system, particularly under the conditions which attended maintenance work in those days, was not and could not be efficient. Run-ins, detentions due to equipment troubles, complaints of defects of all kinds, heavy and expensive repair bills, a large and constantly increasing list of cars out of service for repairs, all these features of electric service made it the laughing stock of steam-railroad men who had long since learned the need for proper maintenance facilities.

Night inspection, owing to the fact that more cars were laid up at that time than during the day and that cars could be got at then with less trouble, was one of the first attempts to give the cars a looking over with any degree of regularity. The reason mentioned was its chief advantage. The disadvantages were numerous. In the first place, a proper inspection was impossible owing to darkness, which the car inspectors' lanterns or even drop lights could not dispel sufficiently to enable work to be done intelligently. Then, too, the class of men who would work at night for the wages which prevailed were for the most part of inferior caliber. To replace brakeshoes, refill the oil or grease boxes and change motor brushes was about the extent of their abilities. As the work was done at various points, most of it in open yards, no proper watch could be kept over the men, and discipline and organized effort were almost unknown.

Many roads in consequence changed to day forces and endeavored to have every car looked over daily. Theoretically this should have insured a high degree of efficiency, but the system as started, while an improvement over former conditions, speedily showed weaknesses. At the beginning of this period it was customary to inspect and repair the cars wherever they happened to be laid up, the majority, of course, being in open yards or on tracks in carhouses which had no pits. This necessitated a force of men in every storage yard or terminal and scattered about the carhouses, some on the pits or in the shop proper, some on the storage tracks. The expense of proper supervision of such scattered forces made efficient work practically an impossibility. The result was that outside of the shop proper the work of inspection was not properly done, the men grew lax, necessary repairs were slighted or omitted altogether, and even conscientious and capable workmen found it impossible to go properly over the motors, trucks and rigging, owing to the lack of pits and the difficulty of getting at the apparatus. An excessive amount of repair material and spare equipment of all kinds had to be carried because of the number of repair points, thus tying up large sums of money on dead stock. Theft of copper, brass, wire, etc., was easy, and in many places constituted a serious item of loss.

DAY INSPECTION AT REGULAR INTERVALS

The larger roads were the first to realize that methods and conditions had to be radically altered and that it would be a measure of economy voluntarily to bring in a car for an hour or two over the pits eight or ten times a month and to pay for a thorough inspection at such times, in contrast to laying up the car three or four times from necessity for minor repairs and possibly once or twice when an armature had to be rewound, a controller rewired or a body rebuilt as the result of a collision caused by poor brakes. Pressure from the claim departments, which were calling for some definite system of inspection on which they could stand when asserting that their equipment was not responsible for accidents of one kind or another, also contributed toward the same result.

These larger roads, therefore, as a general rule, gradually worked into a fairly regular system of day inspection on a time basis, the intervals between inspections varying from one to ten days, but for the most part from three to six days. This was a tremendous movement forward from the old practices and had many decided advantages. After it was once fairly under way the fact that a certain fixed number of cars would be laid up for daily inspection simplified the organization of the shop forces, enabled work to be planned in a systematic manner, made it more probable that small defects would be remedied before serious trouble developed and resulted in an immediate and marked decrease in the number of cars taken out of service daily for defective equipment and in the number held out of service for heavy repairs. This was a decided advantage during the heavy service hours of the morning and evening, from the standpoint of the transportation department, whose operation is usually hampered by lack of sufficient cars to handle its traffic at such times, and the gain to this department of having sufficient cars when the need for them was greatest more than offset the initial disadvantages of being compelled to "lay up" certain specified cars during the period of lighter service. Since the number of cars that appeared on the daily inspection lists was usually less than the normal quantity stored in the yards during the non-rush hours, little extra light mileage was required.

CONCENTRATION OF MAINTENANCE WORK

With the development of consistent maintenance, larger shops and more ample pit room evidently became a more and more pressing necessity, and on the more progressive roads they were provided. Moreover, it was decided to concentrate all work in as few shops as possible. Other things being equal, it stood to reason that a large shop which handled many cars a day could be operated more cheaply per car than a small shop. This was partly due to the fact that the cost of erection and equipment per car handled was less for the larger shop, and that much of the machinery and tools provided for the larger shop would have to be duplicated in the smaller one. Then, too, the salaries of clerks and foremen would not be proportionately higher for a shop handling 100 cars than for one taking care of ten or twelve. Again, the inspectors could be better proportioned to the work done in the larger shop. For instance, assuming that a control inspector could properly care for but twelve cars a day, then in a shop where fifteen cars a day were inspected two controller men would have to be provided. In a shop handling sixty cars a day five men could handle the controllers. In other words, four times the amount of work could be done with only two and one-half times the expense, the cost per car in the larger shop being 35 per cent less. Of course, in practice the one man in the smaller shop would probably be required to cover the entire fifteen cars, in which case the efficiency of his inspection would suffer. Either way the advantage in efficiency of maintenance and in cost per car lay with the larger shop. The realization of the truth of this led to the concentration of all inspection, repair and overhauling work in a few large, central shops provided with well-lighted pits.

ECONOMIES OF CONCENTRATION

Concentration resulted in a more direct and immediate saving of expense than did probably any other step. As an instance, on one division of the company mentioned by the writer an average saving of 18 cents per 1000 car miles in lubricating costs alone was effected in the first year after the concentration of all work into two large shops. The total saving effected was approximately $6,000 a year. Several causes which aided this result may be mentioned simply as an indication of what occurred in many other classes of material. Where oiling was done at terminals and in open yards cold weather caused the oil or grease to freeze or become so stiff that it could not be poured. As a result, the first step of the oiler's daily work was to build a fire of oily waste, upon which he would empty as much oil as would probably lubricate all the cars that he had in charge. With the fire thus made, he would thaw out his oil can and warm himself, making frequent trips back to this fire or starting new ones at other locations through the day. As most of the work was without proper supervision, the amount of oil used per car depended entirely upon the judgment of the oiler, usually a man of limited intelligence and experience, who naturally wasted many times the amount really necessary. Other workmen who had free access to the oil used it for cleaning their hands and tools, for starting fires, etc. The result was that the railway paid for an enormous amount of oil and waste for which it received no return whatsoever. The mere change from outside, unsupervised work to inside work under the eye of a foreman wiped out a big factor of loss. What was true of lubricants was equally true of much other material, especially copper and brass, the value of which makes them the mark for thieves both within and without a railway's forces.

The reduction of material costs, however, was little or no greater than that of labor, since it was found that a large reduction in forces could be made immediately. One cause was better supervision. When the inspection was done outside of the shops the men had every opportunity to shirk their work if inclined to do so. With the completion of the new shops and the bringing of all cars into them for inspection every employee had to punch a time clock morning, noon and night. The saving effected by this one item, judging solely by the results obtained, was enormous. As a matter of fact, an initial decrease of approximately one-fourth was effected in the payroll during the first year; within three years, with the number of cars handled by each shop increasing each year and the mileage made per car also increasing, the maintenance work was being handled by a force more than 30 per cent less than under former conditions. The original inspection and road repair force took care of approximately one car per man per day. Three years later they were handling two cars per man per day, with a reduction in defects and operating complaints that was equally remarkable and pleasing.

One other factor, and a most important one, also contributed toward these results, however, and that was the overhauling of the equipment on a regular time basis. Hitherto I have spoken only of inspection work, and much that was said of the steps leading up to the time inspections applies to the overhauling work as well. It was felt that, no matter how conscientiously and carefully inspections were made, the short time allowable per car and the inaccessibility of many parts made it imperative that at regular intervals the air compressors, controllers, trucks and motors should come off the cars, be thoroughly and carefully gone over and placed in a condition as nearly perfect as possible. Accordingly the motors and trucks were placed on a sixty-day overhauling basis and the controllers and air compressors on a yearly basis. This work supplemented the pit inspections, and while an added expense at the start, speedily paid for itself by the reduction that was made in grounded armatures, baked fields, controller ex-

plosions and burn-outs, broken truck frames and axles—all that host of serious accidents which result in heavy repair bills and in much lawsuit and claim department expense as well.

STANDARDIZATION AND MILEAGE MAINTENANCE

While these steps were going on an aid in effecting results was obtained by standardization on all classes of the equipment. Wherever practicable parts were made interchangeable, and much defective or antiquated equipment was scrapped and replaced with more modern apparatus. The initial expense of this was high, and it is difficult or impossible to estimate with any degree of accuracy the savings later made through this policy. That it was one of the main factors in bringing about the efficiency of later years no one connected with the road will question. It is conceded that it was a far-sighted and intelligent policy and that the money spent thereon was wisely invested.

The great personal factor in carrying out these policies was the work of the head of the mechanical department, a man of great executive ability, in building up a compact, unified organization, with a pride in its work and with an *esprit de corps* such as a number of the big steam railroad systems have successfully introduced into their forces. During the period between 1903 and 1910 the general practices as outlined in the preceding columns had been put into operation, and immense benefits in improved service, lessened depreciation and reduced costs had proved the wisdom and practicability of each step. The details of organization, the methods of checking results, the many minor points that were worked out for facilitating work or reducing expense will be treated in a subsequent article. But one more feature of prime importance, as developed in the past three years, deserves mention at this point.

In 1910 it was decided that still further economies could be obtained by a wide adoption of the mileage basis for inspection. At this time inspection was being made on a three-day basis, motor and truck overhauling on a ninety-day schedule and the controllers, air-brake apparatus and body painting were being cared for yearly. To have the cars come over the pits twice a week meant that one-third of the entire equipment had to be laid up daily. It meant, further, that with the equipment in the first-class condition to which it had been brought the inspectors were, as a general rule, spending three-fourths of their time in looking over and testing apparatus that was really in no need of repairs. A careful investigation showed that the periods between inspections and between truck and motor overhaulings could be materially increased without any loss of efficiency or harm to the equipment.

BRAKE IMPROVEMENTS AND THE MILEAGE BASIS

One point only stood in the way of mileage maintenance, the question of brakeshoe wear and of excessive piston travel on the air-brake equipments or of long brake chains on the hand-brake cars. Inasmuch as this was a fault that would mean trouble mainly to the heavier type of cars which had air brakes, it was decided to equip these with slack adjusters so as to cut down automatically the lost motion caused by brakeshoe wear. These cars were then put on a 1000-mile inspection basis and the lighter, hand-brake cars on one of 600 miles between inspections. This, in effect, reduced by approximately one-half the number of cars brought in daily. While this change made more rigid inspections a necessity and meant a decided increase in the amount of necessary work done per car, it still enabled decided reduction in the shop forces to be made within a few months, it resulted in considerable economies in electrical energy and it reduced the transportation department's expense for the crews to handle the cars to and from the shops. The saving in energy consumption was not only in the reduction of motor power for transferring the cars to and from the pits, but also in the elimination of that required for lighting, heating and testing the cars when in for inspection. The same savings applied to a limited extent to the overhauling shops, where the trucks were brought in at different mileage intervals. Trucks which were equipped with the older types of motors were brought in for such low intervals as 7000 miles, others at 10,000, 12,000 and 15,000 miles, while those having commutating-pole motors were allowed to make 30,000 miles between overhaulings. The chief factor in determining these bases was the permissible safe wear on the armature bearings, those with oil-well lubrication being the most efficient.

The total saving effected by mileage maintenance has been tremendous. The only additional expense entailed was that for the salaries of a few clerks who kept and tabluated the car mileage and prepared the inspection lists. The resulting economies have made this expense negligible. A conservative estimate places the average reduction in maintenance costs per car mile at 0.15 cent, which on any road will mean a very considerable sum of money in the course of a year and on the system to which I refer amounts to considerably more than $100,000 yearly. Nowhere is the value of small economies in the unit cost more strikingly exemplified than in railway maintenance.

While this change was being accomplished the efficiency of the equipment did not suffer. Indeed, it increased in an inverse ratio to the reduction in costs. Detentions due to equipment failures, while not entirely eliminated, as common sense shows they can never be even under the most rigid and painstaking methods of maintenance, have been reduced to a point where they compare very favorably with those of any other railroad, steam or electric, in the United States. Cars "run in," that is, taken from service as the result of equipment failures, particularly in train service, have been brought down to a negligible quantity, averaging on many of the lines about 0.05 of 1 per cent of the cars operated. Complaints of defects of all kinds, preventable and unavoidable, combined have been cut down fully 50 per cent on an average, and as much as 80 per cent in many instances.

CONCLUSION

The point that I have endeavored to bring out, and one which cannot be emphasized too forcibly, is that the high degree of efficiency attained was the direct result of the broad general policy of systematizing all the work of the department and of planning methodically and scientifically to eliminate all lost motion or wasteful effort. Had this policy not been the basis no amount of energy, skill or technical knowledge on the part of the officials, the foremen or the individual workmen could have succeeded in producing the same results. The general average of skill or of intelligence among the personnel of one railroad does not differ materially from that of another. Operating conditions, whether of climate, of traffic congestion or of roadways, are as difficult in this city as in any other part of the country. As much or more old equipment is in operation as there is on any other railway in proportion to its size. On few roads is the general condition of equipment worse than it was upon this system up to within a few years ago. This condition has been changed, and radically changed, for the better, and the two words that tell how the new order has been brought about are "scientific organization."

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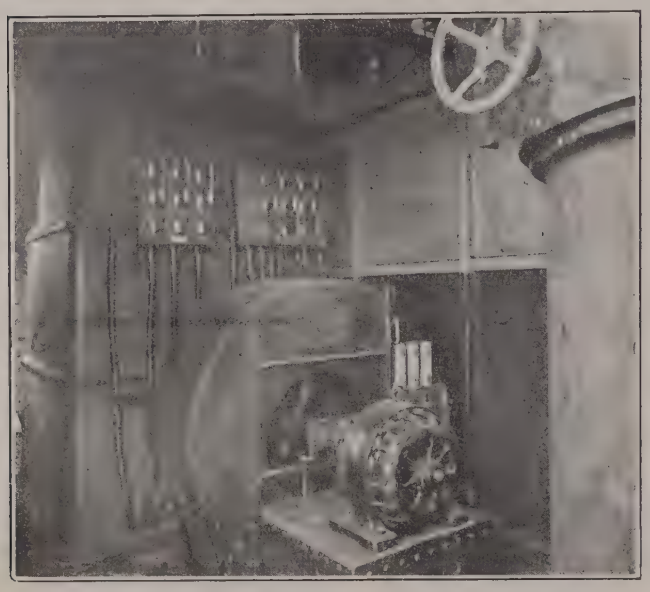
The advantages to be gained by the production of a thoroughly porous metal are as a rule overlooked. If such metal could be obtained, it would make possible the manufacture of journal brasses which would to a large extent carry their own oil, and solder might be impregnated with rosin. Prof. H. T. Hannover, of Copenhagen, recently suggested a method of producing porous plates which consisted in melting together two metals having different melting points, and then by submitting the composition to a moderate heat combined with pressure, the metal with the lower melting point was expelled, leaving a porous block of the other metal.

# A Steel Car Substation with an Automatic Power-Input Control

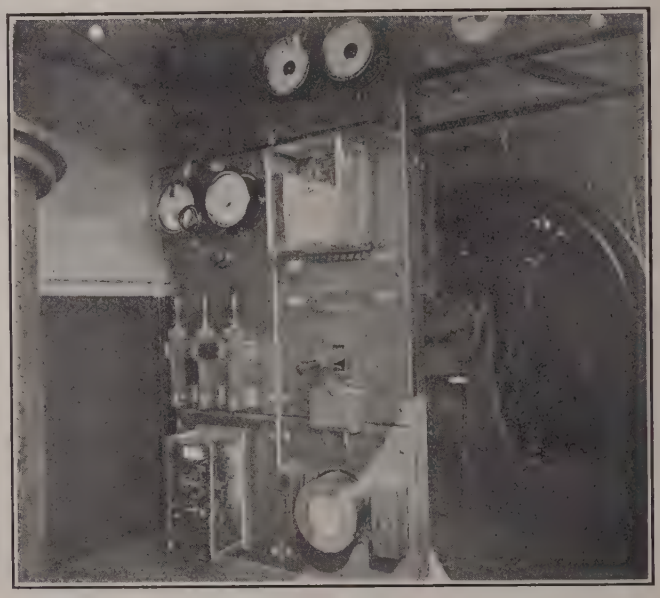
**This Car Has an Automatic Relay Attachment to Insure That the Power Taken by It Will Be Constant**

BY C. L. CADLE, ELECTRICAL ENGINEER NEW YORK STATE RAILWAYS

Some unusual and exceedingly interesting features are involved in the equipment of the steel car portable substation that has been placed in service lately by the New York State Railways Company, which operates out of Rochester, N. Y. To appreciate just why the substation was designed as it is, one must understand the relations of the New York State Railways with the other public service companies in the territory. Hence, in explanation, the New York State company obtains its energy from the Rochester Railway & Light Company, which while it has some generating stations of its own is also the distributing agent for the Niagara, Lockport & Ontario Power Company. The contract under which the Rochester company purchases energy from the Niagara company provides for payment on a peak basis. This makes it very desirable to maintain the load on the high-tension lines from Niagara as nearly constant as possible and to throw the peak loads on the local steam and water power plants. The car substation usually takes its energy from the Niagara company's high-tension lines, and to insure that the power taken by it will be constant the following scheme was developed and applied: An automatic relay attachment mounted on the switchboard is provided. This relay so controls the motor-driven regulator that, if the voltage which is impressed on the a.c. side of the converter (hence the d.c. voltage) is varied, the load taken by the converter from the high-tension circuit is maintained constant irrespective of the d.c. trolley voltage. In this way the input to the substation is maintained constant.



Portable Substation—Transformers and Blower Set



Portable Substation—Switchboard and Rotary Converter

Portable Substation—Exterior View and Part of Interior Showing the Motor-Driven Induction Regulator

Another feature of great practical importance is that

this portable substation can be connected to feed into a d.c. line on which the voltage is very low. There are two taps on the transformers, one giving a high voltage and one a low voltage. In case the trolley line voltage is very low at a point where it is desirable to cut in the substation temporarily, the switch on the a.c. side of the converter can be connected to the low-voltage taps of the transformers to provide a d.c. voltage which will be sufficiently low to permit the converter to be connected to the trolley line.

The induction regulator is capable of providing approximately a 15 per cent buck and a 15 per cent boost in voltage. When the converter is connected to the low-voltage taps of the transformer the normal d.c. potential is 475 volts, and with the regulator a variation of from 375 volts to 575 volts can be obtained. With the converter connected to the normal voltage (650 volts) taps of the transformer, the d.c. voltage range is 550 volts to 750 volts. Through this provision for regulating the d.c. voltage the substation can also be connected to feed in at the heavily loaded end of a trolley line which is operating at a very low voltage and which would, if the portable substation were connected in at normal voltage, throw an excessive load on the converter and probably cause it to buck and flash over.

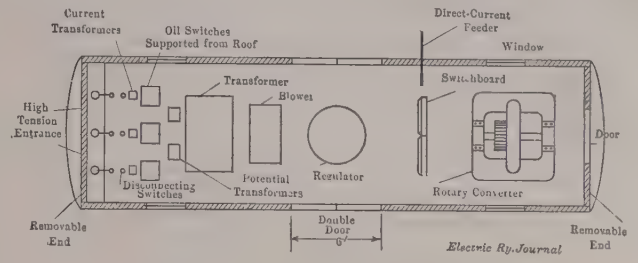
It will be noticed that the high voltage (575 volts) on the low taps overlaps the low voltage (550 volts) on the high taps by 25 volts. The reason for this is that it was desirable so to provide voltage ranges that the converter could be cut in on the d.c. brushes, which normally are operated at 575 volts, while connected to either the high-voltage or low-voltage taps of the transformer.

It has been so arranged that, by means of jumpers connected within the case, the primary windings of the transformer can be connected in either delta or star, which adapts the outfit for operation on either 11,000-volt or 16,000-volt high-tension circuits. There is occasion to feed the station from lines of both of these voltages.

The substation was purchased for the usual reason—to assist on lines heavily loaded temporarily during fairs, picnics and holidays. It was first placed in service at the time of the recent annual conclave of the Shriners in Rochester. The car substation was located at Genesee Valley Park, where it supplied enough energy to handle satisfactorily an immense load which the generating stations, having to feed through long lines, could not have handled.

An application of this substation car that is new so far as the writer knows is its use for testing high-tension lead-covered cable. After a new high-tension underground cable has been drawn into the ducts and spliced, the car is hauled to some point on the cable route and the converter is operated inverted; that is, it takes d.c. energy from the trolley line and delivers it as alternating current from the collector rings. This alternating current is stepped up by the transformer so that by adjusting the transformer taps and the potential regulator testing potentials varying from 9000 volts to 22,500 volts can be impressed on the cable. The usual cable-testing voltage is 20,000. The three-phase transformer in the car substation was submitted to a 33,000-volt insulation test by its manufacturer. The car substation has been used several times very effectively for boosting in cases where it was not feasible to locate it at the point where the load concentrated. In such cases the substation is connected to a high-tension line at the most advantageous location, and the converter is cut in series with the d.c. trolley feeder.

The arrangement of the apparatus in the car is shown in the plan and the wiring diagram on this page. It should be noted that all of the equipment is arranged in a logical order from the high-tension a.c. entrance to the point where




Plan of Portable Substation

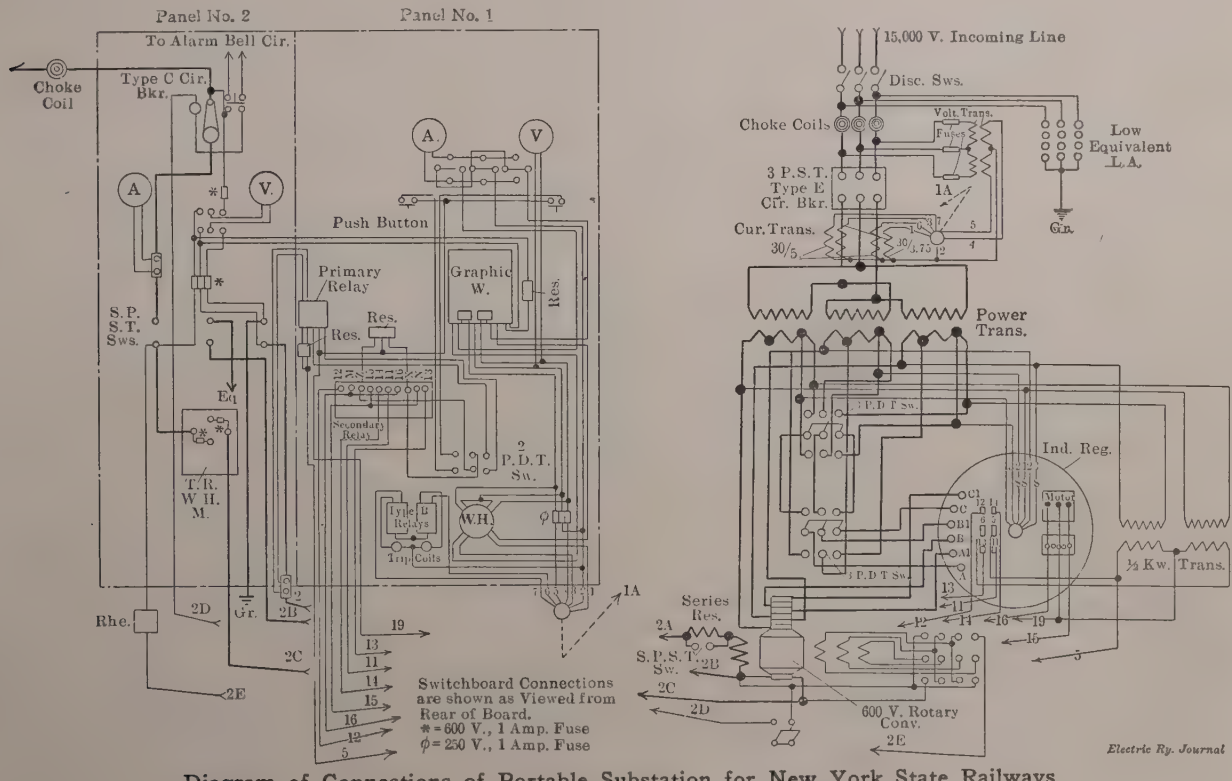



Diagram of Connections of Portable Substation for New York State Railways

the 600-volt d.c. feeder leaves the side of the car. The high-tension entrance was made through the end rather than through the roof because it permitted a simpler construction. Where entrance bushings are carried through a roof there is always more or less difficulty in making a water-tight joint around them.

The McGuire-Cummings Company built the steel car under the direction of the engineering department of the New York State Railways. All of the electrical equipment was furnished by the Westinghouse Electric & Manufacturing Company. The rotary converter is a 500-kw, six-phase, 25-cycle machine, operates at 500 r.p.m. and is of the a.c. self-starting type. The air-blast three-phase transformer has a rated capacity of 550 kva and is wound for a primary voltage of 11,000 delta and 16,500 star. The motor-driven blower shown on page 376 furnishes cooling air for the transformer and regulator. The switches mounted on the transformer case are for connecting to the low and normal voltage taps hereinbefore mentioned. The three-phase induction regulator is arranged for either automatic or hand operation and is of 160½ kw capacity.

## SIXTH CONGRESS OF THE INTERNATIONAL SOCIETY FOR TESTING MATERIALS

The following are abstracts of the papers of general electric railway interest which were presented before the International Society for Testing Materials at its sixth congress, held in the Engineering Societies Building, 29 West Thirty-ninth Street, New York, from Sept. 3 to Sept. 7 inclusive:

A METHOD OF FORESEEING RAIL FRACTURES, BY A. MESNAGER

Surface fissures on the head of a rail are found to have great influence in causing fractures. They can be detected on the top face of a rail in the track by filing off about 0.004 in. and etching with weak hydrochloric or sulphuric acid several minutes. They are still better seen if the surface is then treated three to four minutes with tannin containing 3 per cent gallic acid and rubbed clean, or printers' ink rubbed on the etched surface, wiped off and a sheet of white paper pressed on, producing a print of the cracks.

SOME FEATURES OF THE AMERICAN STEEL-RAIL SITUATION, BY J. P. SNOW

Standardization of steam rail sections in 1893. Rail failures following mill changes in decade after 1895. Investigations of failures, agitation for improvement of rails, and thick-base rails of 1907. Segregation and unsoundness in rail steel. Relation of steel-making processes to rail quality. Expert investigations of rail question now in progress. Complexity of steel manufacture and impossibility of discovering a single simple panacea for defects.

AMERICAN RESEARCH WORK CONCERNING STEEL RAILS BEING CONDUCTED JOINTLY BY THE RAILROADS AND STEEL MANUFACTURERS, BY M. H. WICKHORST

Increasing steam rail fractures some years ago led to starting thorough investigative work. The service of rails has grown to be very severe, and until recently the conditions of manufacture were in part unfavorable. The investigation was first directed to studying segregation, and diagrams of ingot segregation have been obtained. In studying ductility, deficient ductility has been found in certain parts of the rail section. The drop test made with rail head down is better to detect poor ductility than the drop test with base down. The temperature of rolling has not been found to have great influence on the rail. The work is being continued.

INSURING SOUNDNESS IN STEEL RAILS, BY R. W. HUNT

Unsoundness due to piping and segregation in the rail field gives more trouble with the large ingot of modern rail-mill practice than with the small ingot. Heavy discard from the top of the ingot, though practised for high-grade steel products, has not been adopted in rail practice. Means for preventing piping have been found too costly and too slow. The best present method of testing soundness gives results which apply only to the particular ingot selected for tests and leaves a large part of the heat untested. A test routine which will give an interior section for each ingot is outlined. Discarding the upper end of every ingot is advocated and reasons are given for believing this a practicable course.

THE WEAR OF BRONZES, BY A. PORTEVIN AND E. NUSBAUMER

The Derihon abrasion test machine described at the fifth congress was used. In this machine the test piece is pressed against a polished steel disk running in an oil bath. The following conclusions are drawn: (1) The wear of ordinary bronzes is proportional to the tin content, or rather to the delta content. (2) Presence of phosphorus yields a bronze wearing less than non-phosphoric bronzes high in tin but more than non-phosphoric bronzes low in tin. (3) A hardened skin may form during the test, upon whose disappearance there is sudden rapid wear. (4) A tendency to crystallization on annealing corresponds to this hardening.

THE NATURE OF AUTOGENOUS WELDING OF IRON AND STEEL, AND APPLICATIONS, BY M. BERMANN

In autogenous or oxy-acetylene welding two pieces are united while their contact surfaces and the bonding metal are in fluid state. The welding flame should be slightly oxidizing. Iron oxide is reduced by the manganese, phosphorus and silicon contents of the steel, assuring metallic contact of the iron particles. The binding metal must be identical with the metal of the pieces to be welded.

PAINTS FOR METALLIC STRUCTURES, BY A. S. CUSHMAN

Of the several factors of the efficiency of paints for metallic surfaces, chief attention in recent years has been given to the influence of the pigment on the underlying metal. The electrolytic theory of rusting has been received with great favor. Under this theory the action on metals of various pigments in water was compared. Exposure tests at Atlantic City, now in progress, extend this comparison to pigments in linseed-oil coatings. The exposure tests of paints at the Havre de Grace (Md.) bridge are also of note. Studies of paint vehicles are in progress, mainly to find substitutes for linseed oil. The United States Navy Department has devised excellent anti-corrosive and anti-fouling paints for ships' bottoms.

NOTES ON THE TESTING OF ANTI-CORROSION PAINTS, BY P. LABORDERE AND F. ANSTETT

The authors undertook studies of paint films. Their final method of preparing the films is painting them on a coating of sugar on drawing paper, in two coats each 0.1 mm thick, and after six days cutting the paper-sugar-paint sheet into strips, 0.15 m x 0.05 m, and soaking each strip in water ten minutes to remove the paint strip from its foundation. A series of tests was evolved in which the tensile strength was measured seven, fourteen and twenty-one days after drying, with exposure to (a) normal conditions, (b) water, (c) warm air (120 deg. Fahr.), and (d) sulphur dioxide vapor. To measure elasticity a folding test is suggested. Permeability is also measured. Some results of preliminary tests are given. Different films of the same paint agreed closely.

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The administration of the Italian State Railways is now considering a plan to electrify a great part of its lines, and for the present it is proposed to electrify the line from Rome to Ancona, which has a total length of 190 km (113 miles). Water power from the Falls of Terni and Fabriano will be utilized to generate current. It is stated that if the results of the operation of this section prove satisfactory the administration intends to arrange for the gradual electrification of the whole railway system. It is probable that the system of electrification used will be of the three-phase type, in which the power is delivered from two overhead contact wires, the rails forming the third phase-conductor.

## TRAVELING EXHIBIT OF ELECTRICAL APPLIANCES FOR INDUSTRIAL USES

A novel yet appropriate means for increasing its industrial power business has been adopted by the Albany Southern Railroad, which supplies electricity to the cities of Rensselaer and Hudson, N. Y., as well as to the intervening farming country and villages. To induce those living in villages to travel considerable distances to the display rooms maintained by the company at Hudson and Rensselaer has been a difficult matter, and to obviate this it was recently

Portable Electrical Display—Show Cars at Siding

decided to take a display to the various villages by means of cars especially equipped for that purpose.

The "Electric Special," a train of two cars, was equipped with a full line of electrical appliances such as motors, pumps, mills, suction cleaners, washing machines, etc., and scheduled for a one day's stop at each of the stations in the territory served.

The proposed side-tracking of this train at certain stations on given dates was thoroughly advertised by the distribution of circulars, one of these notices being left at every house about one week ahead of the arrival of the train and another notice being delivered at each house after the train had arrived at the station. Visitors to the exhibit received a numbered card, with a coupon attached, on which they wrote their names, addresses and the nature of the appliances in

Portable Electrical Display—Pumps and Meat Choppers

which they were interested. Prizes were given to the holders of lucky numbers as follows: First prize, choice of sewing-machine motor, electric dome, fan, electric portable or coffee percolator, ranging in value from $14.50 to $16; second prize, electric grill worth $7.50; third prize, electric iron worth $4, and special prize, season ticket for two to Electric Park, this company's pleasure resort.

One car was devoted to devices requiring motor drive for their operation—large and small pumps, both direct-connected and belted, coffee mills, bone and meat grinders, different types of electric washing machines, and several applications of the pump jack for transforming windmills and house pumps to motor-driven outfits. The other car,

Portable Electrical Display—Household Outfits

which was a standard freight car lined throughout with white bunting, was arranged to exhibit to the best advantage a full line of electrical devices for household use, counters being erected along the sides and ends. This car contained a demonstrating kitchen including electrical range and oven, chafing dishes, coffee percolators, toasters, water heaters, etc., all connected and in use. Biscuit, toast, muffins, cake, candy, coffee, etc., were made and served to visitors. Electric fans and an ozonator gave excellent ventilation.

The results of the trip were fully up to expectations, the people turning out in large numbers and showing great interest in the exhibition. Many appliance sales were made and one of the most gratifying results was the large number of prospective customers thus reached. R. H. Smith, man-

Portable Electrical Display—Sewing Machine and Flatirons

ager, states that the number of orders taken for motor-driven appliances has fully justified the effort made.

The train was in charge of E. K. Ford, the commercial agent for the company, assisted by the company's solicitors and representatives and demonstrators from the various supply houses. The company was so gratified with the results that in all probability a similar trip will be made next year.

## CLOSING SESSION OF CENTRAL ELECTRIC RAILWAY CONVENTION—MR. CRALL'S PAPER

The closing session of the Central Electric Railway Association convention at South Bend, Ind., was held on Friday, Aug. 30, and attended by about sixty members. After the election of five new members to the association, E. B. Peck, vice-president Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, offered a resolution to amend the association's by-laws reducing the regular meetings to two instead of four annually and making the date of the two proposed meetings the second Thursday and succeeding days in January and July. After a short discussion relative to this change, President Whitney instructed the secretary to mail a notice of the proposed change to each member of the association, making it possible to bring the amendment up for final action at the November meeting. In the absence of F. A. Healy, secretary and treasurer Ohio Electric Railway Company, Mr. Peck, of Indianapolis, read for him his paper on "Insurance from the Standpoint of the Insured." Discussion of this subject was delayed in Mr. Healy's absence, and the second paper of the regular program was read by Charles H. Logan, joint express agent Electric Depot Company, Detroit, Mich., entitled "The Trials and Tribulations of the Joint Express Agent." Following Mr. Logan's paper a vote of thanks was extended to those members who had prepared papers for this meeting of the association. The next meeting will be held at Columbus, Ohio, Nov. 21, provided the committee on arrangements can secure satisfactory accommodations.

At the close of this session C. N. Wilcoxon, general manager Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., announced that the special cars would be ready for the association trip to Gary, Ind., probably at 11 o'clock. About sixty members made the trip over the Chicago, Lake Shore & South Bend Railway Company's lines, and on their arrival at Gary a luncheon was served at the hotel followed by a trip in the observation train through the various departments of the Illinois Steel Company's plant at this point.

A telegraphed account of the sessions held on Thursday, Aug. 29, was published in the Electric Railway Journal for Aug. 31, together with abstracts of all the papers except that by J. H. Crall, general passenger and freight agent Terre Haute, Indianapolis & Eastern Traction Company, on "The Joint Weight and Inspection Bureau from a Revenue Standpoint as a Result of Three Months' Trial." An abstract of this paper follows.

### MR. CRALL'S PAPER

Some six months or more ago, when the question of the establishment of a joint weight and inspection bureau was discussed at a meeting of the Central Electric Railway Traffic Association, I was much in doubt as to its advisability; in fact, at that time, I was opposed to it. I based my opinion on the theory that the local agents should be able to prevent any violation or abuse of classification, weights and rates, and, again, I doubted whether there were enough of these violations and abuses to justify the expense that a bureau of this kind would cause. It was finally recommended, however, that a test at least should be made, using the methods now employed by the joint weight and inspection bureau of the Central Freight Association, this test to be made by the employment of one man at the Indianapolis freight terminals. This recommendation was reported to the executive committee of the Central Electric Railway Association and indorsed by it. Since this inspection began on May 25 of this year I must admit that I have entirely changed my mind, and from being skeptical I have become thoroughly convinced that a bureau of this kind should be established and maintained throughout the entire territory of our association. I am also convinced that hundreds of dollars will be saved to the traction lines over and above the expense of maintaining it. Without casting any reflections on the local freight agents we know that their duties, especially at the larger terminals, are of such a nature that they cannot give matters of this kind the close attention they demand. Corrections by local agents as to rates and classification may be possible, but correction as to weights requires a close personal inspection.

The following are only a few of the many corrections made:

A shipment of 100 rolls of roofing paper billed out at 5000 lb. actually weighed 6000 lb. The rate applying was 15½ cents per 100 lb., making a difference in revenue of $1.55.

A shipment of pipe and castings was billed out at 1700 lb. and found to weigh 4700 lb. The rate applying was 13½ cents, making a difference of $4.05.

Fifty-two boxes of oranges were billed out at 2000 lb. and the actual weight was found to be 3400 lb., making a difference of $1.50.

Thirty crates of cantaloupes were billed at 1200 lb., the actual weight being 1800 lb., making a difference of $1.65.

Twenty baskets of peaches were billed at 1150 lb. and the actual weight was found to be 1600 lb., a difference of $1.55 in revenue.

Fifty crates of tomatoes and ten crates of cantaloupes were billed at 1050 lb. and the actual weight was found to be 1700 lb., a difference of $1.79 in revenue.

One auto body was billed as first class, 740 lb., when it should have been four times first class, a difference of $4.32.

Nine ice boxes were billed at 60 lb. each, or a total of 540 lb. The actual weight was found to be 200 lb. each, or a total of 1800 lb.

A manufacturer having an order for 268 auto bodies was billing these consignments out at 450 lb. This was changed to 550 lb., the actual weight. On this order alone there was an increase in revenue of $77.72.

We have record of a shipment of advertising matter billed at 1050 lb., which was found to weigh 4250 lb., making a difference of $9.15 on one shipment. This correction was made and approved by the shipper.

We have record of a buggy being billed out in a crate, the dimensions given being 54 in. According to this dimension it would take a rate of double first class, but it was found to measure 66 in. high and 70 in. long, changing the rate from double first class to three times first class.

We have a record of a shipment made billed as wire cots taking second class, when the shipment should have been made as wire mattresses, taking one and one-half times first class.

These are only a few out of the hundreds of abuses that we have found since this inspection began.

You will note that nearly all of these corrections are made on the weights and not on the rate or classification. It necessarily follows that to detect these errors in weights the personal attention of an inspector would be required, as the billing clerk invariably issues his expense bill from the information given him on the shipping instructions. The corrections made at the Indianapolis station on this trial test made by one man alone, from May 25 to Aug. 25, resulted in a saving of $1,186.16, or an average of $16.90 a day. The expense of maintaining and carrying on this inspection was about $300. This saving could have been vastly increased by the employment of additional inspectors, as the amount of freight handled at this particular point (that passing through four different freight houses) is too heavy to enable one man to give personal attention to all shipments.

As a business proposition would it not be advisable to establish a bureau of this kind, the revenue from which would be four times the cost of maintenance? You would do this in your private affairs, and the same principle should certainly be applied to the conduct of the electric railway business as well.

## CHICAGO WAGE AGREEMENT VOTED DOWN BY EMPLOYEES

A surprising turn in what appeared to be a satisfactory settlement in the street railway wage controversy in Chicago was brought out by the trainmen's referendum vote Aug. 29. This vote, which was overwhelming against an acceptance, means that the adjustment will have to be submitted to a board of arbitrators as the final move. The railway companies have agreed to this and the employees expressed their desire to do so by the form of ballot employed in the referendum vote. Another surprising feature of the employees' repudiation of the contract recommended to them by their officers was that both the South Side and the North and West Side unions voted to reject the offer. Soon after the terms of the proposed agreement were announced it was seen that the attitude of the North and West Side men would be doubtful, because they believed that the majority of the concessions were in favor of the South Side men and did not affect the men of the other union. The officials of the railway companies involved were much disappointed as they had hoped that the matter was settled and they could devote their time to questions of operation.

As a result of this action on the part of the employees, Mayor Harrison proposed that the city should have a representative on the arbitration board. The representatives of the union agreed that the request was reasonable because the city was interested to the extent of 55 per cent of the net receipts of the surface railway companies. The trainmen have named Judge Kickham Scanlan as their representative on the board of arbitration. As in the conferences preceding the agreement just refused, the employees are demanding a joint board and a uniform contract. The Mayor was advised of the situation by the representatives of the men and requested to arrange a conference between the officers of the companies and the joint committee of employees.

At a conference held in the presence of Mayor Harrison, Sept. 4, there was considerable discussion relative to the plan of arbitration, the employees insisted on one board of arbitration and the companies preferring that there be two boards, each company adjusting its own differences. After careful consideration both the employees and the railway companies refused to consent to the city being represented on the board, and Mayor Harrison decided to drop the demand. It was agreed, however, that the city might select a representative to sit in the conferences, but that he would not have voice in the proceedings or vote upon the final result .

At the conference held Sept. 4 in Mayor Harrison's office, after considerable wrangling the representatives of the employees bolted and accused the officials of the railway companies of bad faith, requesting time to hold a conference by themselves. At the close of this conference a resolution was presented to the railway companies represented by President Leonard Busby of the City Railway and J. M. Roach of the Railways Company. The resolution requested a reply from the companies' officials as to whether they would agree to a joint arbitration board, or else that there should be arbitration with one company and that both companies should abide by the decision made by the one arbitration board. The reply was requested within twenty-four hours.

In the meantime President B. I. Budd of the elevated companies submitted a proposition to his employees offering them an increase in wages over those in the contract just expired. After a vote taken by the day and night employees it was announced that the offer had been almost unanimously refused. It is expected that whatever steps are taken by the men on the surface lines will be followed by the elevated employees.

## SERVICE OVER THE MANHATTAN BRIDGE, N. Y.

Street railway service over the Manhattan Bridge, which spans the East River between Brooklyn and New York, was established by the Manhattan Bridge Three-Cent Line on Sept. 4, 1912, following the dissolution of the injunction to restrain the company from operating and to prohibit the

**Manhattan Bridge Cars at Brooklyn Terminal**

Brooklyn Edison Company from furnishing power for the cars. The Brooklyn & North River Railroad, the stock of which is held jointly by the Brooklyn Rapid Transit Company, Third Avenue Railroad, Coney Island & Brooklyn Railroad and the New York Railways, also proposes to operate over the bridge a shuttle service similar to that now given over the Williamsburg Bridge, and numerous court actions have resulted to determine the respective rights of the companies. The Manhattan Bridge Three-Cent Line proposes eventually to operate into Manhattan and over the bridge into Brooklyn as far as the Flatbush

**Stringing Trolley Wire for Manhattan Bridge Line**

Avenue terminal of the Long Island Railroad for a 3-cent fare. Its present equipment consists of ten 32-ft. vestibuled cars. It was reported that the company carried 3500 passengers the first day. On account of the proposed rapid transit subway work the approaches to the bridge have not been completed and the structure is still somewhat inaccessible. John C. Brackenridge, who formerly was chief engineer of the Brooklyn Rapid Transit Company, is vice-president of the Manhattan Bridge Three-Cent Line.

## DULUTH STREET RAILWAY WRECKING CAR AND WORK CAR

The Duluth Street Railway, Duluth, Minn., is equipped with a wrecking and general utility car of novel design. Essentially the car consists of an all-steel underframe 37 ft. 2½ in. over the bumpers and 8 ft. over-all width. The underframe construction is novel in that the design includes

Duluth Track Car

two 7-in. 80-lb. T-rail side sills and two 5-in. 80-lb. T-rail center sills. The cross beams are made of two 1-in. x 5-in. steel straps with a 5-in. x 5-in. oak separator. The car floor and sides are of 1¾-in. wood construction with wooden stakes and hinged panels in the car sides so that they may be dropped, leaving the floor clear when the stakes have been removed.

The trucks are of this company's standard, known as No. 7, design, with 5-ft. 8-in. wheelbase and outside-hung brakes. Each truck is equipped with two GE-70 motors. Mounted directly over the center of the rear truck is an 8-ton revolving electric crane which includes essentially a cast-steel bearing plate bolted to the car underframe and a slip ring, the inside of which has been supplied with a rack cast as a part of it. By the use of a set of swivel driving gears the slip ring may be revolved through a complete circle.

Two drums are mounted in a heavy cast-steel frame supported on the slip ring. These drums are driven by two 7½-hp General Electric motors. One is used for raising the load at the end of the 13-ft. 6-in. boom and is installed at the back of the operator's platform; the other

Duluth Wreckage Crane Car

raises the boom and is installed beside the first motor. A third 7½-hp motor has been installed on the car body clear of the revolving crane parts and rotates the crane through a set of gears. The three motors are controlled by three GE type R-28 controllers installed at the front of the operator's platform.

The motorman's cab is at the opposite end of the car from the crane. It is of wood construction, 4 ft. 1¼ in. x 6 ft. 1¼ in. in plan. The trolley stand is mounted on a 3½-in. x 12-in. ridge beam which extends 2 ft. 8 in. beyond the rear of the cab. A five-light cluster has been installed directly under the stand to furnish artificial illumination to the car body at night, as a complete set of blocking necessary in wrecking is carried under the boom.

The wrecking car was designed and built at the Twin City Rapid Transit Company's shops in St. Paul, Minn., as the Duluth company's president is C. S. Goodrich who is also president of the Twin City lines.

In designing the crane the engineers were governed by the limited head room available under the trolley wires and the desire to build a wrecking car that would handle ordinary loads and at the same time would not be so cumbersome as to restrict its movement over the railway company's lines.

### WORK CAR

The work car used by the track department is approximately 46 ft. over bumpers and 8 ft. 8 in. wide. The design of the underframe and trucks is similar to the design used in the wrecking car, except that it is mounted on lighter trucks of the company's standard design. The utility car is equipped with two motorman's cabs so that it may be operated from either end; the design of the cabs and trolley-stand mounting is the same as that employed on the wrecking car.

A novel feature in the work-car equipment includes two small cranes with 20-ft. jib booms installed at each end. A 1-ton electric hoist has been mounted on a trolley which may be run the length of the jib boom. The mast is guyed to the car underframe by three 1-in. tie rods and energy is supplied to the electric hoists through a flexible cable leading from the trolley stand to the mast. The hoist equipments were installed on the work car in order to facilitate handling of heavy material. The installation is comparatively inexpensive and the time and labor saved soon absorbed the cost of the equipment.

## REPORT ON TRAFFIC CONDITIONS IN CINCINNATI

Ross W. Harris, of Madison, Wis., has completed his report on traffic conditions in Cincinnati, Ohio. The report was made for Victor T. Price, director of public service, Cincinnati, Ohio. The report consists of five volumes representing the results of a systematic study of facts pertaining to the various phases of the Cincinnati traffic situation. The recommendations of Mr. Harris for improvement are, in brief, as follows:

"To the end that adequate service in Cincinnati may be realized, it is recommended that congestion, unusual length of time required to reach the outlying districts, inadequate service and the lack of accommodations for future growth of traffic be immediately remedied by the elimination of unnecessary stops, an increase in the average rate of speed, the adoption of adequate traffic regulations, the operation of 'express' cars and their segregation from 'local' service, the operation of long and short haul lines, and the re-routing of cars as indicated in the report.

"It is further recommended that the company take steps immediately to place in commission as many new cars of the most modern type and seating fifty people as will, under changed conditions as to congestion, meet the requirements of adequate service as indicated in the report."

The New York Central Lines has reprinted in pamphlet form the article, "Trespassers Killed on Railways—Who Are They?," contributed recently to the *Railway Age Gazette* by Frank V. Whiting, general claims attorney of the New York Central Lines. The pamphlet also contains the editorial on the same subject which was published by the *Railway Age Gazette* at the time the article appeared in its columns.

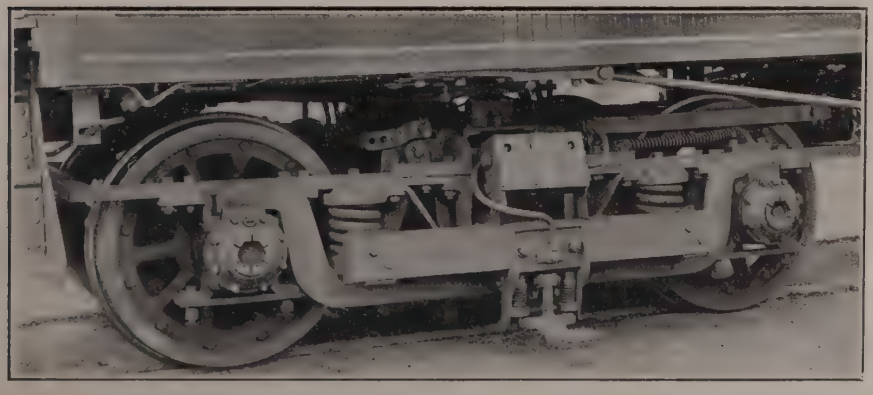
## ROLLER-BEARING CAR JOURNALS ON THE PHILADELPHIA & WESTERN RAILWAY

Among the first electric railways to adopt roller bearings on main car journals was the Philadelphia & Western Railway, which operates a high-speed third-rail system over private right-of-way. Thirty-eight-ton cars equipped with multiple-unit control are operated in trains made up of one or more at a speed of 50 m.p.h. to 60 m.p.h. over rock-ballasted track. The schedule calls for close headways and train operation is controlled by an automatic block signal system.

In November, 1911, a set of roller-bearing car journals, manufactured by the Standard Roller Bearing Company, of Philadelphia, Pa., was installed under car No. 37. In January, 1912, cars No. 46 and No. 2 (baggage) were equipped, and in June, 1912, car No. 35 was equipped. These cars have never been held up for a minute on account of journal trouble, and they are the most popular on the road. They are said to accelerate faster, run faster, ride more easily, brake faster and coast more freely than do the cars operating on plain friction bearings. In addition there is a saving in power and in cost of lubricant and attendance. Only infrequent inspections and oiling are necessary.

While roller-bearing cars operating singly are much more sensitive than plain-bearing cars in responding to the control and brakes, the manufacturers of this type have found that the difference in two-car trains is even more marked. The cars operate as one in reality as well as in supposition. Acceleration and retardation take place without the jerking and bumping so common in plain-bearing equipment. The maker's experience has further demonstrated that roller-bearing cars brake more rapidly than do plain-bearing cars with a given application of air. In other words, for the same rate of braking less air is required and there is a decreased demand on the compressor.

These bearings are essentially the same as the ones installed on the six high-speed steel Pullman cars which the Lehigh Valley Transit Company is to operate between Allentown and Philadelphia. An adjustable thrust nut carrying a standard roller thrust bearing takes care of the end thrust exerted by the journal. The roller bearing and nut are integral and may be adjusted to secure the desired lateral movement between the journals and the box. This adjustment remains constant, thus contributing to the easy riding qualities of the car by eliminating unnecessary and undue side movement and the resulting side slap set up in the car body. The roller-bearing thrust also contributes to the free coasting of the car, especially on curves and uneven track, since it does away with the wedging friction which is characteristic of the plain bearing when it is subjected to end thrust under these conditions. The bearings are also dust-proof and oil-tight.

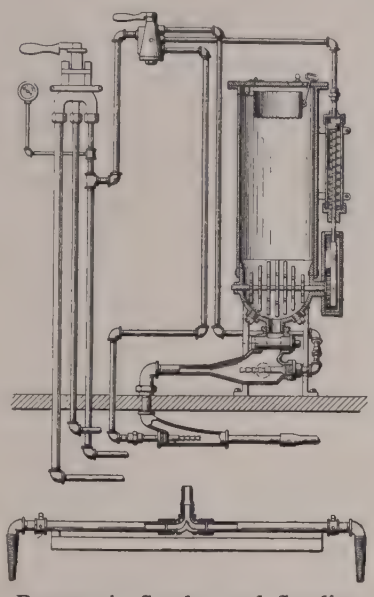


Roller-Bearing Journals, Philadelphia & Western Railway

In a test made early this summer a car which was equipped with plain bearings took 6.2 kw-hr. per car mile compared with an energy consumption of 5.2 kw-hr. per car mile for one of the roller-bearing cars which made exactly the same run.

## WORCESTER COMPRESSED-AIR SANDER

After a satisfactory trial, the Boston & Worcester Street Railway has ordered the new type of compressed-air sander illustrated herewith for six cars now under construction by the Bradley Car Company. The new sander, which is made by the Sault Manufacturing Company, Worcester, Mass., embodies means for shifting and loosening the sand, blowing it rapidly through the supply pipes, feeding it to two rails at one time and depositing it on the track as gently as a gravity sander. Means are also provided for blowing out the piping before and after sanding. The sand is stored on the platform in a metal cylinder to which it is introduced by a shaking screen. The various operations are effected by the manipulation of three ports of the motorman's sander valve. As shown in the accompanying drawing, the middle port controls a piston alongside the sand reservoir. The rod of this piston has a reciprocating rack which engages a ratchet wheel, the extended shaft of which has radial arms to loosen the sand in the hopper before it enters the vacuum trap below. The passage from the trap to the supply system is controlled by means of an ordinary steam plug valve which is shut off whenever inspection, cleaning or the like is needed.



Pneumatic Sander and Sanding Outlets for Both Rails

When the motorman's valve is adjusted to allow air to flow through the top port and connecting pipe into a nozzle at the end of the vacuum trap, a substantially continuous jet of air is available for drawing the sand from the trap. The outlet of the trap is secured to a discharge pipe by means of a union elbow whereby the trap mechanism can be disconnected from the discharge pipe without disturbance. The other conical nozzle shown in the discharge pipe receives air momentarily by way of the bottom port of the motorman's valve for the purpose of cleaning out the discharge hose before and after using. As shown in the lower drawing, the discharge hose may be provided with a connection to give separate sanding for each rail. The downward-hung close-coil spring sand outlet to each rail was adopted: first, because a freely hung spring permits the sanding terminal to vibrate with the motion of the car, thus throwing off moisture, ice, etc.; second, because the gaps between the turns of the spring are too small to permit the escape of sand but large enough greatly to reduce the air's velocity.

## LONDON LETTER

*(From Our Regular Correspondent)*

The Cardiff Corporation tramways have had a record year, and for the first time have applied a portion of their profit to reduce the rates, amounting to one penny in the pound. The good record is due largely to last year's favorable summer. Mr. Ellis, the general manager, points out that it is not to be expected that the record will be repeated this year, especially as the weather has been unfavorable. The increase in the number of passengers carried was nearly 2,000,000 and the surplus balance for the year was £18,500, as compared with £12,000 for the preceding year.

The Belfast tramways and electricity committee has approved a report on the proposed extension of the electricity undertaking prepared by T. W. Bloxam, the city electrical engineer, and S. I. Pearce, of the Manchester Corporation electricity undertaking. The report recommends the erection of new buildings and the acquisition of additional plant, the cost of the first instalment of the latter being estimated at £89,208.

The tramways department of the Birmingham Corporation will introduce on its new tramway route along Hagley Road a service of single-deck cars, very few of which are in use in England. The Corporation has undoubtedly been influenced in its decision by the fact that the London County Council has secured parliamentary authority to run trail cars on certain routes in London at specified hours. It is illegal to run trail cars at present in provincial towns, but it is hoped that the power granted to the London County Council by Parliament will enable the Board of Trade to facilitate the extension of the system to other areas. Undoubtedly many cities would be glad to use trail cars during the rush hours. The construction of the new route will not be commenced until October. The tramways department is securing a car of the single-deck type which will be tried on various existing routes as soon as it arrives. The tramways committee also has under consideration the question of providing trackless tramways in some of the outlying districts, and Mr. Baker, the general manager of the department, has been instructed to prepare a scheme of trackless trams showing the probable cost of construction and the operating expenses.

Horses have almost disappeared from the tramway systems of Scotland. Of 300 miles only 4¼ miles are worked by horses, and the only street system of any importance in which the cable is employed is in Edinburgh. There are 300 miles of tramways in Scotland and in the last ten years Scotland has made more relative progress than England. Since 1900 193 miles of line have been opened in Scotland, one-third being owned by the Corporation of Glasgow.The remainder represents lines which are practically interurban tramways, giving long-distance runs between and through industrial towns. The longest journey possible by tramway in Scotland is from Larkhall, in Lanarkshire, through Glasgow, to Balloch on the banks of Loch Lomond, a total distance of 37 miles, but there are three changes of cars.

At the recent meeting of the shareholders of the London & South Western Railway the chairman stated that estimates were being prepared for the electrification of the circular route of that railway which passes through Wimbledon, Kingston, Richmond and other places. The subject has been under consideration for some time, but now definite action is being taken and the directors have called in Sir Alexander Kennedy to advise them.

The Metropolitan Railway has received a favorable decision from the House of Lords as to its contemplated extension from a point near Rickmansworth to Watford. The company's electric service at present extends only as far north as Harrow, but the existing line between Harrow and Rickmansworth can be electrified at a cost of about £250,000, and so another connection will be made with Watford. The London & North Western Railway's new electric lines from Queen's Park to Watford are practically completed, and the work on the connection from Queen's Park to the Bakerloo Railway is being undertaken. Watford passengers will then have the choice of traveling by the North Western route of through electric trains to Euston, Broad Street or any station on the underground railways, or by the new route mentioned above with through Metropolitan electric trains to the city and by Great Central steam trains to Marylebone.

The new extension of the Central London Railway (the original "Twopenny Tube") has been completed and is leading to a considerable increase in traffic. The new Liverpool Street station of this railway is immediately underneath the huge station of the Great Eastern Railway, which probably brings in more suburban passengers than any other railway in London, and it will undoubtedly lead in time to a very handsome increase in the business of the Central London Railway. Electrically operated escalators have been installed at the Liverpool Street station instead of lifts, so that there is no delay in entering or leaving.

The London County Council has secured the right from the select committee of the House of Commons to run trailers on a number of routes on the south of the Thames and including the Thames Embankment and Blackfriars, Westminster and Vauxhall bridges, so that the circular routes might be provided for. In evidence Mr. Fell, general manager of the London County Council Tramways, stated that at present all cars were subject to the licensing jurisdiction of the police commissioner and the position was that while the Board of Trade was prepared to allow cars to be coupled together, the police commissioner would not license them if coupled together. The clause sought to provide that the police commissioner should not refuse a license merely because cars were coupled together. Mr. Fell referred to the increase in tramway traffic and stated that the use of trailers appeared to him to be the only solution for dealing with the tremendous morning and evening rush of passengers, and also with the congestion at certain hours on Saturdays. As to the question of danger, he said there were seven times as many accidents with motor cars as with trail cars.

The highways committee at London has proposed a series of schemes for new tramways, and one for running railless cars, in order to link up the tramway system. To enter more successfully into the fight with the motor omnibus the Council is also to be asked to secure tramway running powers across the new St. Paul's Bridge, by means of which tramway cars from the south will be able to reach Cheapside by means of a tunnel from the city side of the bridge to Cheapside. The tunnel will cost £86,000. The suggestion that this tunnel should be extended to meet the tramways of the northern section has been abandoned on account of the enormous expense involved. Commenting upon the municipal tramways generally, the highways committee recalls that the finance committee has directed attention to the decrease in passenger traffic receipts. The highways committee says that there can be no doubt that this is in part due to the increase in the competition of other means of locomotion over the Council's existing tramway routes during the last twelve or eighteen months. Tramways, it is pointed out, do not secure much midday traffic, and in the morning and evening workmen are carried at cheap fares, only 2d. being charged in some cases for return journeys of as much as eighteen miles. The tubes and motor omnibuses get traffic all through the day. Hence it is suggested that the Council should run tramways along routes where there is a large volume of traffic all day, and this is why the Marble Arch scheme is to be re-introduced. Dealing with the railless proposals, it is explained that this system is already working with considerable success in Leeds and Bradford and at certain places on the Continent. No street widenings will be required in connection with the railless routes, and the cost of installation is considerably less than that involved in the construction of lines on the overhead or underground system.

The Corporation of Croydon has decided to seek parliamentary power to run motor buses within and without the borough and to tax motor buses. The tramway committee reported that it seemed unjust for the corporation, which maintains the roads, not to be permitted to operate cars.

The engineer to the Aberdare Council in attempting to overcome the difficulty of running trolley omnibuses over tramway routes has proposed that the omnibus shall also carry a tramway trolley pole and a "skate," so that when it has finished its "railless" journey the overrunning current collector may be hauled in and the vehicle proceed to the shed by means of its spare mast, with the skate on the steel rail for the return current.

A. C. S.

# News of Electric Railways

### Safety Committees at Los Angeles

The Pacific Electric Railway, Los Angeles, Cal., has appointed two committees—a division safety committee and a central safety committee—to meet every month to discuss ways and means to prevent accidents to both public and employees and to study preventive methods. The divisional committee is to be composed of one man from each department, while the central committee will be made up of officials of the company representing the entire system. To this latter committee reports will be made by the divisional committee. The company has chosen one man from each phase of railroad work to serve on the division committee for three months, to be succeeded by another from his department at the end of the term. One of each of the following will act on the committee: Superintendent (chairman), claim agent, assistant superintendent, trainmaster or inspector, dispatcher, equipment instructor, instructor of conductors, yardmaster, interurban passenger conductor, interurban passenger motorman, city passenger motorman and conductor, freight motorman, freight conductor, ranking division officer of the electric department, ranking division officer of the maintenance of way department and ranking division officer of the mechanical department. The superintendent and chairman of the committee will advise all employees that recommendations pertaining to the cause and prevention of accidents on the lines will be welcomed by him and will be fully discussed at the meeting of the full committee on the fifteenth of each month, at which time the secretary of the committee will report to the central safety committee. All suggestions for safety improvements must be submitted in writing and, if not at variance with the standard practice, will be acted upon by the superintendent, while others will be referred to the central safety committee for future action. The central committee will hear all reports of the sub-committee on accident prevention and will discuss measures of safety made necessary by the adoption of safety suggestions. The central safety committee is organized as follows: J. McMillan, general manager, chairman; S. A. Bishop, general claim agent; E. C. Johnson, assistant chief engineer; F. F. Small, mechanical engineer; S. H. Anderson, electrical engineer; A. E. Roome, superintendent of signals; J. C. McPherson, superintendent of Northern Division; W. T. Maddex, superintendent of Southern Division; W. C. White, superintendent of Western Division; A. B. Merrihew, superintendent of San Bernardino Division; M. P. Graftholdt, superintendent of Riverside Division; F. L. Annable, superintendent of San Antonio Division.

### Decision in Regard to Atlanta & Macon Railway

The Railroad Commission of Georgia has decided to enter a order approving an issue of $1,800,000 of capital stock and $3,600,000 of bonds by the Atlanta & Macon Railway, which proposes to build an electric railway 87.4 miles long to connect Atlanta and Macon. In its ruling the commission said in part:

"Petitioner asks the commission to approve an issue of $3,600,000 of capital stock and $7,500,000 of first mortgage forty-year 5 per cent bonds, of which $3,000,000 are to be issued immediately, the proceeds to be used in the construction and equipment of an interurban railway between Atlanta and Macon, a distance of 87.4 miles. The total immediate capitalization desired is at the rate of $82,390 per mile.

"The company does not propose to construct, own or operate power plants, but will buy its power from some other company. The proposed capitalization therefore covers only the road and its equipment, including necessary appurtenances such as stations, terminal facilities, power substations, etc. The estimated cash cost of the entire acquisition, construction and equipment is in round figures $3,235,000, including approximately $160,000 for interest during the construction.

"It is estimated that the bonds will be sold at 85, and therefore, in addition to providing for the above cost out of the bond proceeds, about $545,000 of additional bond capitalization is asked to cover the 15 per cent bond discount. The propriety or wisdom of capitalizing such discounts is questionable, if, indeed, it should not be prohibited. It will be seen from the above statement that a present total capitalization of $7,200,000 is asked, with which to construct and equip 87.4 miles of electric railroad, the estimated cash money cost of which is approximately $3,235,000. It is shown in the evidence that practically all of the stock is to go as a bonus with the bonds. The stock to be issued is more than 100 per cent bonus on the money to be actually expended in investment. If this issue is approved it will be issued as full paid, non-assessable stock.

"The construction proposed in the pending application is meritorious. The railway will doubtless be of great benefit to the section through which it runs provided it is promoted, organized, constructed and operated along lines considerate alike of public and private interests. We desire, for these reasons, to deal with it liberally, and to exercise in the approval of its capitalization issues the widest discretion allowed us under the law consistent with the public good, but holding strongly to the above views as to the limitations on our power of approval prescribed in the law, we cannot sanction the issue of capital stock prayed for. An order will be entered approving the immediate issue of $1,800,000 of capital stock and $3,600,000 of bonds for the purpose named in the petition."

### Meeting of Committees of Pacific Claim Agents' Association

A meeting of the executive and subject committees of the Pacific Claim Agents' Association was held in the offices of B. F. Boynton, claim agent of the Portland Railway, Light & Power Company, in Portland, Ore., on Aug. 24. The meeting was presided over by George Carson, Seattle. The purpose was to outline the work for the year and arrange topics to be discussed at the annual meeting to be held in Vancouver, B. C., next July. The members present were George Carson, claim agent of the Puget Sound Traction, Light & Power Company, Seattle; E. H. Odell, Tacoma Railway & Power Company, Tacoma; Thomas G. Aston, Washington Water Power Company, Spokane; E. M. Grover, Northern Pacific Railway, Tacoma; A. M. Lee, Northern Pacific Railway, Seattle; H. K. Relf, Spokane, Portland & Seattle Railroad, Portland, and the Spokane & Inland Empire Railroad, Spokane, and B. F. Boynton, Portland Railway, Light & Power Company, Portland.

### Owl Car Service Ordinance Vetoed

Mayor Rushlight has vetoed the ordinance passed by the Council to require the Portland (Ore.) Railway, Light & Power Company to establish owl car service. The Mayor arranged previous to the passage of the ordinance for an experimental owl car service and says in his veto message that the service proposed in the ordinance would be unnecessarily burdensome to the company and would not benefit the public. He said in part: "I believe this ordinance to be unjust in that it prescribes regulations that are unreasonable as well as unnecessary. According to its provisions the company is required to operate cars on parallel lines, and in some instances on the same tracks, thereby duplicating the service and creating an unnecessary expense which would not in any manner benefit the traveling public. On some of the shorter lines much opposition is shown by residents to the proposed owl cars. Many residents who use the Jefferson Street line say that the district served by these cars is within the easy walking zone, and they oppose the innovation of night cars on the ground that they would disturb their rest without being of any benefit. Through my efforts the president of the Portland Railway, Light & Power Company consented to begin an all-night service on the main trunk lines of the city Saturday night, Aug. 24. He has agreed to run the cars on these lines for thirty days as an experiment, and after that time, if it is demonstrated that there is a demand for such service, I have his assurance that it will be continued. By this agree-

ment the new service will begin thirty days earlier than if the ordinance should be approved. For these reasons I hereby return the ordinance to your honorable body for your further consideration."

**Appropriation for Appraisal by City in Kansas City.**—Both branches of the City Council of Kansas City, Mo., have passed the ordinance appropriating $25,000 to be used by the Mayor to secure the appraisal of the property of the Metropolitan Street Railway in the interest of the city.

**The Primaries at Detroit, Mich.**—William B. Thompson has been renominated for the office of Mayor of Detroit on the Democratic ticket. His course in regard to street railway matters is well known. Oscar Marx has been nominated for Mayor by the Republicans. He favors municipal ownership of street railways.

**Increase in Service Ordered in Washington.**—Orders have been issued by the District Electric Railway Commission to the street railways which operate in Washington, D. C., to increase their service during the rush hours of the morning and afternoon. The orders became effective on Aug. 31. The schedules as fixed by the commission are largely of local interest.

**Ohio Road Ordered to Make Improvements.**—The Public Service Commission of Ohio has ordered the Tri-State Railway & Electric Company, which operates along the Ohio River between Steubenville and East Liverpool, to overhaul its lines and erect power stations at two points which it has named. The commission specified that a 3000-kw generator be added to the station at East Liverpool.

**Storm Damage in Southwestern Ohio.**—On the night of Aug. 28, 1912, a storm did much damage at Lebanon, Hamilton and Dayton and at a number of places further north in Ohio. A bridge partly completed over Elk Creek on the Ohio Electric Railway near Trenton was washed away. The electric railways which enter Lebanon were forced to suspend operation and the lines between Xenia and Dayton were also compelled to stop their cars for several hours.

**Short Tunnel in Providence.**—The Rhode Island Company, Providence, R. I., proposes to operate cars through College Hill in Providence and will build a double-track tunnel commencing at North Main Street and extending to Thayer Street, a distance, including approaches, of about 2200 ft. This work will cost approximately $750,000. Bids for construction will be open within a few weeks. H. R. Robertson, division engineer, is in charge of construction.

**Cincinnati's Proposed Subway Entrance.**—On Aug. 30, 1912, Governor Harmon signed the contract by which the State leases to the city of Cincinnati for ninety-nine years that portion of the Miami & Erie Canal within the boundaries of the city. The lease is not assignable, but may be renewed. It is proposed to build a boulevard on the surface along the route of the canal and a subway for the entrance of interurban cars. This was part of the plan when the city proposed to take the property over on a lease. The contract has been forwarded to the Cincinnati city officials for their signatures.

**Toronto to Take Over Toronto & York Radial Railway Lines.**—City Solicitor Johnston, of Toronto, Ont., has reported to the City Council that the proper notices have been served upon the Toronto & York Radial Railway of the city's intention to take over the company's lines within the city limits in East Toronto at the expiration of the franchise in November next and the Mimico line along the Lake Shore Road. The report by E. L. Cousins on the value of these lines has not yet been received. The company has the right to apply to the Ontario Railway Board to fix the price which the city shall pay for the property.

**Tentative Chicago Subway Locations.**—It is understood that at an informal meeting of the Chicago subway commission with the members of the local transportation commission of the City Council of Chicago tentative plans for the location of subways were agreed upon. These plans include lines running north and south under State Street from Devon Avenue to Seventy-fifth Street and under Halsted Street from Lawrence Avenue to Seventy-sixth Street and east and west under Madison Street from State Street to Fortieth Avenue and under Fifty-fifth Street from State Street to Western Avenue. Under present plans there will be four-track lines under Madison and State Streets and two-track lines under Halsted Street.

**Dallas-Waxahachie Line Completed.**—The Southern Traction Company, Dallas, Tex., has completed its line between Dallas and Waxahachie and announced that service would be established between the cities on Sept. 5, 1912. It is planned to have cars leave Dallas on the hour, from 6 a. m. until 8 p. m. The final car will leave at 11:15 p. m. The first car from Waxahachie will leave at 5:30 a. m. and reach Dallas at 6:50 a. m., making that schedule hourly. Cars will leave Lancaster going south to Waxahachie at 5 a. m. and 6 a. m. Through tickets will be sold to the Northern Texas Traction Company and probably later to the Texas Traction Company for Sherman.

**Plans Being Completed for Change from A. C. to D. C. on Pittsburgh & Butler Street Railway.**—In connection with the work of substituting 1200-volt direct current for the present alternating-current system on the Pittsburgh & Butler Street Railway, Butler, Pa., arrangements are being made to establish nine substations along the line between Pittsburgh and Butler to supply light and power in several of the towns traversed by the line. James Bryan, the consulting engineer for the company, has completed plans for the equipment. The line is 33 miles long and surveys have been made for an extension to East Butler. The main power plant is located at Renfrew, midway between the terminals. The company recently authorized an issue of $225,000 of twenty-five-year bonds to cover the cost of installing the substations. Locations have been selected for two of the stations. Current will be transmitted to the substations at 22,000 volts. The General Electric Company will equip the cars and the substations.

**Commission Without Power to Order Extensions in Washington.**—Attorney-General W. V. Tanner, of Washington, holds that the State Public Service Commission is not authorized to require the Puget Sound Traction, Light & Power Company to extend its present lines. Eleven hundred Seattle citizens petitioned the commission to order an extension of the Sixth Avenue Northwest line from North Sixty-fifth Street to the city limits at North Eighty-fifth Street. Appeal to the Public Service Commission has at various times been recommended in the City Council by Councilman Austin E. Griffiths, with the result that the citizens to be served by an extension of the Sixth Avenue Northwest line petitioned the commission to direct the extension to the north city limits. The company has offered to extend its lines if the Council will grant franchises for such extensions which include only the provisions in the franchise grants under which the original lines were constructed. Mr. Griffiths has opposed this plan and the Council has before it now a proposition to include in franchise grants for ten extensions the charter provision that gives the city the right to take over the property without any value being placed on the franchise.

## PROGRAM OF ASSOCIATION MEETING

### Illinois Electric Railways Association

The following program has been announced for the meeting of the Illinois Electric Railways Association, which is to be held at the Hotel La Salle, Chicago, Ill., on Sept. 20, 1912:

MORNING SESSION, 10 A. M.

Call to order, reading of minutes, reports of executive committee, membership committee, traffic committee, signal committee and program committee.

Paper, "Value of Definite Policies in Advertising," by J. J. Rockwell, advertising counselor.

Discussion of the printed report of the signal committee.

AFTERNOON SESSION

Paper, "Handling Traffic in Winter," by Charles J. Jones, superintendent of transportation of the Aurora, Elgin & Chicago Railroad.

Paper, "Sand," by Walter H. Evans, manager of the motor gear department of the Edgar Allen American Manganese Steel Company.

Paper, "Developing Summer Excursion Business," by C. C. Shockley, general freight and passenger agent of the Rockford & Interurban Railway.

# Financial and Corporate

## Stock and Money Markets

Sept. 4, 1912.

The trend of events in politics is regarded as having very little to do with the break on Sept. 3 in the prices of securities traded in on the New York Exchange. On Tuesday there was no upturn during the closing hour. The call money market to-day was slightly easier than yesterday, but several of the largest lenders of call money advanced their renewal rates to-day to the day's maximum of 4 per cent. Rates to-day were: Call, 3@4 per cent; thirty days, 3¾@4 per cent; sixty days, 4@4½ per cent; ninety days, 4¾@5 per cent; four, five and six months, 5@5¼ per cent.

The trading in Philadelphia to-day was quiet. Small sales were recorded of American Railways, Philadelphia Traction and Union Traction. The market for bonds was very dull.

The Chicago market has been very dull, but prices are being well maintained. In a very dull bond market sales were recorded of Chicago Railways 5's and Chicago Railways 5's, Series B.

In the Boston market Boston Elevated Railway and West End Street Railway issues have ruled firm on small transactions. The market for bonds has been narrow and dull.

In Baltimore the general market has been quiet but steady. United Railways notes again made a high record.

Quotations of traction and manufacturing securities as compared with last week follow:

| | Aug. 28. | Sept. 4. |
|---|---|---|
| American Brake Shoe & Foundry (common) | a98 | a98 |
| American Brake Shoe & Foundry (preferred) | a144½ | a145 |
| American Cities Company (common) | a31¾ | a32 |
| American Cities Company (preferred) | a76¾ | 76⅝ |
| American Light & Traction Company (common) | a420 | a428 |
| American Light & Traction Company (preferred) | a112 | a113 |
| American Railways Company | 45 | a44 |
| Aurora, Elgin & Chicago Railroad (common) | a47 | a47 |
| Aurora, Elgin & Chicago Railroad (preferred) | a88 | a88 |
| Boston Elevated Railway | a126 | a126 |
| Boston Suburban Electric Companies (common) | a15 | a15 |
| Boston Suburban Electric Companies (preferred) | a78 | a78 |
| Boston & Worcester Electric Companies (common) | 10 | *10 |
| Boston & Worcester Electric Companies (preferred) | a52 | a53 |
| Brooklyn Rapid Transit Company | 91¾ | 90¼ |
| Capital Traction Company, Washington | a125⅞ | a126 |
| Chicago City Railway | a190 | a190 |
| Chicago Elevated Railways (common) | a34 | 35 |
| Chicago Elevated Railways (preferred) | a92 | a92 |
| Chicago Railways, ptcptg., ctf. 1 | a90 | a90 |
| Chicago Railways, ptcptg., ctf. 2 | a24¾ | a24¾ |
| Chicago Railways, ptcptg., ctf. 3 | a9¼ | a9½ |
| Chicago Railways, ptcptg., ctf. 4 | a4½ | a4¼ |
| Cincinnati Street Railway | a131 | a131 |
| Cleveland Railway | a105½ | a106½ |
| Cleveland, Southwestern & Columbus Ry. (common) | *5¼ | *5¼ |
| Cleveland, Southwestern & Columbus Ry. (preferred) | *35 | *35 |
| Columbus Railway & Light Company | a55 | a55 |
| Columbus Railway (common) | a85 | a85 |
| Columbus Railway (preferred) | a95 | a95 |
| Dayton Street Railway (common) | a25 | a25 |
| Dayton Street Railway (preferred) | a100 | a100 |
| Denver & Northwestern Railway | *140 | *140 |
| Detroit United Railway | 70 | 70 |
| General Electric Company | 182¼ | a182½ |
| Georgia Railway & Electric Company (common) | 126 | a126 |
| Georgia Railway & Electric Company (preferred) | 85 | a85 |
| Interborough Metropolitan Company (common) | 20¾ | 19⅝ |
| Interborough Metropolitan Company (preferred) | 59¾ | 58¼ |
| International Traction Co., Buffalo, 4% bond rcts | *75 | *75 |
| Kansas City Railway & Light Company (common) | a18 | a18 |
| Kansas City Railway & Light Company (preferred) | a40 | a40 |
| Lake Shore Electric Railway (common) | *8½ | *8½ |
| Lake Shore Electric Railway (1st preferred) | *85 | *85 |
| Lake Shore Electric Railway (2d preferred) | *22 | *22 |
| Manhattan Railway | 135 | a135 |
| Massachusetts Electric Companies (common) | a19⅜ | a19¼ |
| Massachusetts Electric Companies (preferred) | a77¾ | a77⅜ |
| Milwaukee Electric Railway & Light (preferred) | *105 | *105 |
| Norfolk Railway & Light Company | 26 | 26 |
| North American Company | 86½ | 85 |
| Northern Ohio Light & Traction Company (common) | a72½ | a70 |
| Northern Ohio Light & Traction Company (preferred) | a102 | a105 |
| Philadelphia Company, Pittsburgh (common) | a52 | a51⅞ |
| Philadelphia Company, Pittsburgh (preferred) | a44½ | a44 |
| Philadelphia Rapid Transit Company | a25⅞ | a26 |
| Portland Railway, Light & Power Company | *69 | *69 |
| Public Service Corporation | 120 | a121 |
| Third Avenue Railway, New York | 37⅞ | 36¾ |
| Toledo Railways & Light Company | a8 | a6 |
| Twin City Rapid Transit Co., Minneapolis (common) | a108 | a107⅛ |
| United Rys. & Electric Company (Baltimore) | 25¾ | a26⅛ |
| United Rys. Inv. Company (common) | a32½ | a33 |
| United Rys. Inv. Company (preferred) | 62 | a60½ |
| Virginia Railway & Power Company (common) | *44½ | *44½ |
| Virginia Railway & Power Company (preferred) | 87½ | a87½ |
| Washington Ry. & Electric Company (common) | a91⅞ | a95 |
| Washington Ry. & Electric Company (preferred) | a95½ | a97 |
| West End Street Railway, Boston (common) | a86* | a85¾ |
| West End Street Railway, Boston (preferred) | a99 | a99 |
| Westinghouse Elec. & Mfg. Company | 87 | 86¾ |
| Westinghouse Elec. & Mfg. Company (1st preferred) | a130 | a130 |

* Last sale. a Asked.

## ANNUAL REPORT

### Interborough Rapid Transit Company

Results of operation of the Interborough Rapid Transit Company, New York, N. Y., during the year ended June 30, 1912, compare with the preceding year as follows:

| Year ended June 30— | 1912. | 1911. |
|---|---|---|
| Revenue from transportation | $30,371,834 | $28,923,937 |
| Other street railway operating revenue | 874,558 | 843,415 |
| Gross operating revenue | $31,246,392 | $29,767,352 |
| Operating expenses: | | |
| Maintenance of way and structures | $1,685,653 | $1,581,750 |
| Maintenance of equipment | 2,773,395 | 2,562,800 |
| Traffic | 587 | 1,746 |
| Transportation expenses | 7,342,703 | 7,110,510 |
| General expenses | 1,245,464 | 1,112,175 |
| Total operating expenses | $13,047,802 | $12,368,981 |
| Net operating revenue | $18,198,590 | $17,398,371 |
| Taxes | 1,979,431 | 1,925,091 |
| Income from operation | $16,219,159 | $15,473,280 |
| Non-operating income | *1,305,200 | 339,915 |
| Gross income | $17,524,359 | $15,813,195 |
| Interest and sinking fund on city bonds | $2,312,943 | $2,254,692 |
| Interest on three-year 6 per cent. gold notes due May 1, 1911 | ..... | 576,980 |
| Interest on 5 per cent forty-five-year gold mortgage bonds | 1,617,034 | 1,235,933 |
| Sinking fund Interborough Rapid Transit Co. 5 per cent forty-five-year gold mortgage bonds | 329,692 | 300,000 |
| Interest on Manhattan Railway consolidated mortgage 4 per cent bonds | 1,591,080 | 1,591,080 |
| Interest on New York Elevated Railroad 5 per cent debenture bonds | 50,000 | 50,000 |
| Manhattan Railway rental (organization) | 10,000 | 10,000 |
| Guaranteed dividend—7 per cent on Manhattan Railway Co. capital stock | 4,200,000 | 4,200,000 |
| Amortization of debt discount and expense | 97,087 | 31,270 |
| Interest on unfunded debt | 786,180 | 416,293 |
| Other rent deductions | 6,577 | 6,910 |
| Total income deductions | $11,000,593 | $10,673,158 |
| Net corporate income | *$6,523,766 | $5,140,037 |
| Dividends on Interborough Rapid Transit Co. stock (10 per cent —5 per cent extra for 1912) | 5,250,000 | †3,500,000 |
| Surplus | $1,273,766 | $1,640,037 |
| Per cent expenses to earnings: | | |
| Excluding taxes | 41.76 | 41.55 |
| Including taxes | 48.09 | 48.02 |
| Passengers carried | 607,244,697 | 578,154,088 |
| Daily average passengers carried | 1,659,138 | 1,583,984 |

*Including first dividend (15 per cent, $900,000) on capital stock of Rapid Transit Subway Construction Company.
†Including an extra dividend of 1 per cent declared payable Oct. 2, 1911, out of the earnings for the year ended June 30, 1911.

T. P. Shonts, the president, says in part in his statement to shareholders:

"After the payment of all charges and the regular dividend of 10 per cent upon the capital stock, the net surplus for the year was $3,023,766. This amount includes $900,000 received from the dividend on the capital stock of the Rapid Transit Subway Construction Company, the first dividend paid by that company since its organization in 1900, leaving $483,729 as a gain in surplus from the operations of the year. Excluding this $900,000, the net corporate income for the year was $6,623,766, equivalent to 16.07 per cent on the capital stock of the company as against 14.68 per cent for the preceding year.

"The operating expenses for the year were increased by approximately $450,000 owing to extraordinary maintenance expenditures incidental to the work of bringing the subway equipment up to the high standard required for the operation of ten-car trains. There was also an increase of about $95,000 in subway division taxes due to an increase in taxes on real estate caused by a decision of the courts that the assessments of the power and substations must include the value of the buildings, whereas heretofore the taxes had been computed on the value of the sites only.

"Your directors declared an extra dividend of 5 per cent during the year, which was paid by reason of the receipt of a dividend on the stock of the Rapid Transit Subway Construction Company owned by your company and the refund to the treasury of amounts previously charged against the income account of the company and which did not appear in last year's balance sheet of the company as part of surplus profits. Notwithstanding this payment,

there was an increase in profit and loss surplus for the year of $1,540,912.

"The total number of passengers carried for the year was 607,244,697, an increase of 29,090,609, mostly obtained through the subway division. A large portion of this increase can be attributed to the enlargement of station platforms and the inauguration of a ten-car train service. The installation of electric fans and the comfort they contributed was also an important factor, and by reason of the improved subway service many apartment houses that had been constructed during the last few years adjacent to the subway lines were more generally occupied. Moreover, there was an increase of 2,200,000 in the number of tickets sold at the Atlantic Avenue (Brooklyn) station.

"Gross operating revenue for the year ended June 30, 1912, was $31,246,392 as compared with $29,767,352 last year, an increase of $1,479,040, or 4.97 per cent, the result of a gain on the subway division of $1,340,701, or 9.34 per cent, and on the Manhattan Railway division of $138,339, or 0.90 per cent.

"Net operating revenue was $18,198,590 as compared with $17,398,371 last year, an increase of $800,219, or 4.60 per cent, the result of a gain on the subway division of $752,486, or 8.93 per cent, and a gain on the Manhattan Railway division of $47,733, or 0.53 per cent.

"Income from operation was $16,219,159 as compared with $15,473,270 last year, an increase of 4.82 per cent, the result of a gain on the subway division of $657,121, or 8.06 per cent, and a gain on the Manhattan Railway division of $88,758, or 1.21 per cent.

"Non-operating income was $1,305,200 as against $339,915 last year, an increase of $965,285, or 283.98 per cent, the result of an increase on the subway division of $932,845, or 290.98 per cent, and on the Manhattan Railway division of $32,440, or 167.82 per cent.

"Gross income was $17,524,359 as compared with $15,813,195 last year, an increase of $1,711,164, or 10.82 per cent, the result of a gain on the subway division of $1,589,966, or 18.76 per cent, and on the Manhattan Railway division of $121,198, or 1.65 per cent.

"Total income deductions were $11,000,593 as compared with $10,673,158 last year, an increase of $327,435, or 3.07 per cent, the result of an increase on the subway division of 6.80 per cent.

"The net corporate income was $6,523,766 as compared with $5,140,037 last year, an increase of $1,383,729, or 26.92 per cent, the result of a gain on the subway division of $121,198, or 8.19 per cent.

"During the past year your fire protection and fire-fighting facilities have been maintained in a high state of efficiency. No fire of any consequence occurred. Arrangements have been made to install additional high-pressure water pipes for fire protection at the 179th Street and Third Avenue yard, at a cost of approximately $30,000.

"The system of inspection and supervision of your properties, from the standpoint of insurance and fire prevention, has been further perfected by installing a system of report blanks destined to place direct responsibility for defective conditions on the officer or employee having immediate charge of their correction. This is effected by having engineers employed by your insurance representatives make continuous rounds of the properties and send reports to your executive offices on three different colored forms, a red form indicating a dangerous condition requiring immediate correction, a green form indicating a less urgent condition, but one requiring attention, and a white form indicating recommendations for standardization at a given point.

"The effect of this system is to enforce rigidly and promptly all possible precaution for fire prevention, and during the past twelve months your properties have been unusually free from fire loss of any kind.

"The New York Board of Fire Underwriters has recently completed an inspection of your properties, and its report, dated July 1, 1912, contains the following:

"'As a matter of fact we wish to compliment you on the condition of the property generally, and we will be glad to co-operate with you in any way to facilitate an early disposition of the recommendations under consideration.'

"These latter recommendations refer to matters already covered in the regular inspection service and which were at that time receiving attention.

"Despite a continued dull period in real estate, your properties have suffered no loss in revenue. The land at the northwest corner of Third Avenue and Ninety-eighth Street, under the elevated structure, was leased for twenty-one years at an aggregate rental of $115,000, with provision for regaining possession of the property in case it should be decided to discontinue the use of the remainder of the block for shop and yard purposes.

"Your property north of 218th Street, east of Broadway, comprising six blocks, or approximately 145 lots, has enhanced in value through the continued building activities in the Dyckman section. During the coming year it is proposed to open and grade the streets through this property and to offer the lots for sale, with the exception of the dock front on the Harlem Ship Canal, which it seems best, in the interest of your company, to retain, for the present at least."

In regard to maintenance on the Manhattan Railway division, Mr. Shonts says in part:

"Twenty cars were equipped with coasting device, seventy-one cars were equipped with new-type shoe fuses, 123 cars were equipped with anti-climber devices, 941 cars were equipped with improved fire extinguishers and 1207 cars were equipped with conductors' emergency valves."

In regard to maintenance expenditures on the subway division, Mr. Shonts says in part:

"Fifty cars were equipped with anti-climber devices, 417 cars were equipped with improved fire extinguishers, 284 cars were equipped with bus line resistance, 231 cars were equipped with electro-pneumatic brakes, including installation of new brake rigging, 867 cars were equipped with tungsten lamps, 30 cars were equipped with sanitary handholds and 354 cars were equipped with coasting clocks."

Concerning the progress made in improvements mentioned in the report of the previous year, Mr. Shonts states:

"The remaining twenty of the 100 trailer cars ordered for the Manhattan Railway division in 1909 and the remaining sixteen of the 100 motor cars ordered in 1910 were placed in service.

"The remaining fifteen of the 325 steel motor cars ordered for the subway division were placed in service.

"Two hundred and thirty-one local service cars were equipped with electro-pneumatic brakes so that the subway service is now entirely equipped with this type of apparatus.

"Coasting recorders have been installed in the subway division, making this installation complete on both divisions.

"The installation of new-type conductors' emergency valves on cars of Manhattan Railway division has been completed.

"All subway express cars have been equipped with ceiling fans.

"The installation of collapsible devices on center doors of 177 subway division cars will be started in September and should be completed by the end of November. When this work is done all center doors will have been provided with this protective device.

"The installation of automatic stops in connection with all danger signals now used on the local tracks of the subway has been practically completed."

Among the improvements authorized during the last fiscal year are the following:

"Installation of an emergency power connection with the New York Central & Hudson River Railroad at Fifty-third Street and Park Avenue, that company to pay expense of installation and a minimum of $2,000 per annum for power supplied.

"The equipment of the remaining 351 cars used in subway local service with center side doors and the installation of electric fans on the same cars.

"Installation of destination signs on separating barriers inside of center doors of subway division, to prevent passengers from boarding wrong trains.

"Installation of electric illuminated signs announcing the approach of trains on the most important subway station platforms.

"Equipment of 166 additional cars with sanitary handholds; thirty of these 166 cars have already been equipped and the rest will be equipped by Dec. 31, 1912.

"Seventy-five per cent of subway division cars are now equipped with 32-cp tungsten lamps in place of 16-cp carbon lamps.

"One-third of the subway service is equipped with storage battery emergency lighting outfits, which in the event of trouble with main lighting circuit will cut in two special lamps in each car."

Regarding other matters Mr. Shonts says:

"In keeping with this company's policy of establishing and maintaining a rate of pay and working conditions as good or better than can be obtained in like capacities elsewhere, and in view of the high cost of living, it was deemed advisable during the present year to increase the wages of practically all classes of employees, i. e., conductors, trainmen, gatemen, ticket agents, platform men, switchmen, train clerks, shopmen and office employees. This increase was made effective May 12 and involves an additional expense of approximately $230,000 per annum.

"In making this voluntary increase your directors took into consideration the good records of the men in the service, particularly those coming into contact with the public, which is evidenced by the improved operating conditions and the letters of commendation received from its patrons. They feel, therefore, that the increase is not only amply justified, but will prove beneficial in stimulating interest and giving encouragement to employees of all classes who are earnestly endeavoring to perform their duties properly.

"The appeal in the test case involving the 1909 special franchise assessment of the elevated lines of the Manhattan Railway Company, to which reference was made in the last annual report, has been decided by the Court of Appeals favorably to most of the company's contentions.

"The long litigation over the method of taxing the different portions of the Belmont tunnel was terminated satisfactorily during the past year.

"In proceedings before the assessing officers of the city, the company has finally succeeded in having the power house and substation machinery used in the operation of the elevated lines assessed at actual value on assessment day rather than at a purely arbitrary value determined by its productive capacity.

"Claims, suits and judgments on account of injuries and damages amounted in 1912 to $275,008 as compared with $184,069 in 1911, an increase of $90,939, or 49 per cent. Expenses aggregated $134,288 in 1912 and $114,971 in 1911, an increase of $19,317, or 17 per cent.

"The increase consists mainly of claims paid before suit and suits settled before trial pursuant to the liberal policy of the company in dealing with passengers and employees injured through operations and is partly due to the increase in the number of passengers carried. The company voluntarily settled 2218 such claims for $135,545 and compromised 253 suits before trial for $123,438, an increase of 598 claims settled and seventy-three suits compromised over last year.

"During the year 157 personal injury actions were tried, resulting in forty-five verdicts in favor of the plaintiffs aggregating $29,070, the plaintiffs being successful in only 29 per cent of the cases tried. It is believed that this demonstrates that the courts recognize that the company contests only unfounded claims and presents only meritorious defenses. Some suits of recognized liability were necessarily tried with satisfactory results, where the plaintiffs insisted upon a prohibitive amount in settlement. In cases of this sort liability was admitted in court after a failure of all reasonable effort to effect a settlement. Some of these forty-five verdicts were reversed on appeal, leaving thirty-nine judgments for $16,589, which were paid. At the close of the fiscal year only six judgments were pending on appeal, aggregating $12,968. The company does not take appeals for delay, which is proved by this small number pending at the beginning of the summer recess of the courts. Indeed, only a very few appeals are taken, most judgments being paid promptly without appeal.

"The disbursements in payment of claims, suits and judgments amounted to 0.88 per cent and the expenses of the legal and claim departments were 0.43 per cent of the gross operating revenue, an aggregate for the year of 1.31 per cent, an increase of 0.31 per cent of the gross, or $110,255."

A full account of the proposed new subway and elevated extensions is given in the report.

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**Austin (Tex.) Street Railway.**—The Austin Street Railway has elected new officers as follows: W. J. Jones, president and general manager; E. H. Watriss, vice-president; A. L. Kalloch, secretary; E. P. Wilmot, treasurer; Guy P. Gannett, assistant secretary, and George E. McComber, assistant treasurer.

**Bay State Street Railway, Boston, Mass.**—Perry, Coffin & Burr, N. W. Harris & Company, Inc., and Merrill, Oldham & Company are offering for subscription $2,000,000 of 5 per cent coupon notes of the Bay State Street Railway. The notes are the direct obligation of the company and are followed by $22,605,800 of preferred and common stocks on which dividends are being paid at the rate of 6 per cent per annum. The notes mature annually on Aug. 15 from 1915 to 1932 in various amounts. The circular announcing the offering gives the amount which matures each year, the price with interest and the yield.

**Brazilian Traction, Light & Power Company, Ltd., Montreal, Que.**—The board of directors of the Brazilian Traction, Light & Power Company, Ltd., has declared operative the plan for the exchange of the securities of the company for the stock of the Rio de Janeiro Tramway, Light & Power Company, Ltd., the Sao Paulo Tramway, Light & Power Company, Ltd., and the Sao Paulo Electric Company, Ltd. The terms of the merger were given in the ELECTRIC RAILWAY JOURNAL of July 27, 1912, page 140.

**Chicago & Oak Park Elevated Railway, Chicago, Ill.**—Francis V. Dobbins, receiver for the Chicago & Oak Park Elevated Railway, under insolvency suit brought by George H. Church, has filed in the Court of Chancery at Trenton, N. J., a report showing that he has allowed two claims against the defendant company. One claim is that of Mr. Church for $1,033,813 and the other is that of the Northwestern Elevated Railroad for $492,820. This debt has been assigned by the creditor to Mr. Church. A committee of stockholders of the insolvent corporation has filed in the court objections to the action of the receiver in allowing the claims. Chancellor Walker has not yet passed upon these objections.

**Iowa Public Service Corporation, Cedar Rapids, Ia.**—It is stated that the Iowa Public Service Corporation will be organized under the laws of Iowa with a capital of $6,000,000 to take over the properties in which William G. Dows, J. H. Smith, John A. Reed and their associates are interested, including the Cedar Rapids & Iowa City Railway & Light Company, Boone Electric Company and the Marshalltown Light, Power & Railway Company.

**Lancaster, Oxford & Southern Railroad, Lancaster, Pa.**—It is announced that F. R. Williams, representing interests allied with the Conwingo Power Company, has purchased the property of the Lancaster, Oxford & Southern Railroad for $52,000 from the bondholders' committee, which in March, 1912, purchased the property under foreclosure for $50,000. The plan is, presumably, to equip the line for operation by electricity.

**New York (N. Y.) Railways.**—Upon application of the New York Railway for permission to issue $2,600,000 of additional bonds, the Public Service Commission of the First District of New York has ordered a hearing on Sept. 11. The proceeds of the bond sales are to be applied to purchase 320 cars of the stepless type and to improve the company's carhouse at Fifty-fourth Street and Ninth Avenue. The bonds are thirty-year first real estate and refunding mortgage 4 per cent, of which $16,299,167 have already been issued. The present application, if granted, will bring the amount of such bonds outstanding to $18,900,000.

**New York State Railways, Rochester, N. Y.**—The stockholders of the New York State Railways have approved the plan to execute a first consolidated and refunding mortgage to secure an issue of fifty-year 4½ per cent bonds to the amount of $50,000,000. The plan is to cancel the company's existing mortgage authorizing the issuance of $30,000,000 of 5 per cent bonds. Of the $4,500,000 of 5 per cent bonds which have been issued all are in the hands of trustees. The approval by the Public Service Commission of the Second District of New York of the mortgage to secure the 4½ per cent bonds was referred to in the ELECTRIC RAILWAY JOURNAL of July 13, 1912, page 69.

**Quebec Railway, Light, Heat & Power Company, Quebec, Que.**—Maxime Beauvisage, Antony Thierrée, Louis Galliard and Charles Michel have resigned as directors of the

Quebec Railway, Light, Heat & Power Company. They represented the securities of the company held by French investors, who, it is stated, have lately been disposing of their holdings. The board of directors has consisted of fifteen members, but it is stated that the number of directors will be decreased to eleven.

**Seattle, Renton & Southern Railway, Seattle, Wash.**—United States District Judge Edward E. Cushman at Seattle has ordered the discharge of the federal receivers appointed for the Seattle, Renton & Southern Railway by Judge Cornelius H. Hanford and has decided that the federal court had no jurisdiction in the case.

**Third Avenue Railway, New York, N. Y.**—The Public Service Commission for the First District has received from the Third Avenue Railway a petition asking the consent of the commission for the purchase by the company of 13,560 shares of the stock and $259,000 par value of the bonds of the New York City Interborough Railway for $234,625. The petition sets forth that the Third Avenue Railway owns 28,650 shares of the stock and $1,413,000, par value, of the bonds of the New York City Interborough Railway and desires to purchase additional stock and bonds in the amount stated. The New York City Interborough Railway has outstanding $5,000,000 in capital stock and has an authorized bond issue of $5,000,000, of which $3,000,000 has been issued. Of the $3,000,000 issued $87,000 belong to the sinking fund, $1,211,000 is in possession of the New York City Interborough Railway and $1,702,000 is outstanding.

**Valley Railways, Lemoyne, Pa.**—The Valley Railways, incorporated recently in Pennsylvania to succeed the Valley Traction Company, has been authorized to increase its capital stock from $10,000 to $2,000,000.

**Winona Railway & Light Company, Winona, Minn.**—The coupons due on July 1, 1912, on the $489,000 of first-mortgage 5 per cent bonds of the Winona Railway & Light Company dated 1907 are being paid at the office of the Old Colony Trust Company, Boston, Mass. The property of the Winona Railway & Light Company is in the hands of Howard Morris as receiver.

### Dividends Declared

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent, preferred.

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1¼ per cent.

Louisville (Ky.) Traction Company, 2½ per cent, preferred; quarterly, 1 per cent, common.

West Penn Traction & Water Power Company, Pittsburgh, Pa., quarterly, 1½ per cent, preferred.

## ELECTRIC RAILWAY MONTHLY EARNINGS

ATLANTIC SHORE RAILWAY.

| Period. | Gross Earnings. | Operating Expenses. | Net Earnings. | Fixed Charges. | Net Surplus. |
|---|---|---|---|---|---|
| 1m., July, '12 | $47,560 | $27,396 | $20,164 | $478 | $19,685 |
| 1 " " '11 | 48,520 | 30,117 | 18,403 | 606 | 17,797 |

AURORA ELGIN & CHICAGO RAILROAD.

| | | | | | |
|---|---|---|---|---|---|
| 1m., July, '12 | $192,754 | $102,296 | $90,458 | $33,304 | $57,154 |
| 1 " " '11 | 186,271 | 95,489 | 90,782 | 32,524 | 58,258 |

DETROIT UNITED RAILWAY.

| | | | | | |
|---|---|---|---|---|---|
| 1m., July, '12 | $1,125,056 | $733,613 | $391,443 | $176,302 | $215,141 |
| 1 " " '11 | 973,978 | 616,283 | 357,794 | 177,377 | 180,417 |
| 7 " " '12 | 6,615,998 | 4,228,611 | 2,387,387 | 1,242,328 | 1,145,059 |
| 7 " " '11 | 5,827,578 | 3,642,573 | 2,185,004 | 1,234,654 | 950,350 |

FEDERAL LIGHT & TRACTION COMPANY.

| | | | | | |
|---|---|---|---|---|---|
| 1m., May, '12 | $112,184 | $68,654 | $43,530 | ..... | ..... |
| 1 " " '11 | 96,015 | 57,562 | 38,453 | ..... | ..... |
| 12 " " '12 | 1,335,631 | 768,391 | 567,240 | ..... | ..... |
| 12 " " '11 | 1,213,026 | 682,348 | 530,679 | ..... | ..... |

PHILADELPHIA RAPID TRANSIT COMPANY.

| | | | | | |
|---|---|---|---|---|---|
| 1m., July, '12 | $1,918,941 | $1,156,227 | $762,713 | $758,181 | †$4,532 |
| 1 " " '11 | 1,856,616 | 1,144,767 | 712,049 | 737,289 | †25,240 |

TWIN CITY RAPID TRANSIT COMPANY.

| | | | | | |
|---|---|---|---|---|---|
| 1m., July, '12 | $715,129 | $355,232 | $359,897 | $143,079 | $216,818 |
| 1 " " '11 | 710,067 | 337,555 | 372,512 | 140,079 | 232,433 |
| 7 " " '12 | 4,641,249 | 2,403,838 | 2,237,411 | 998,554 | 1,238,857 |
| 7 " " '11 | 4,492,019 | 2,266,349 | 2,225,670 | 980,554 | 1,245,116 |

†Deficit. *Includes taxes.

# Traffic and Transportation

### Decisions in Worcester Fare Cases

The Board of Railroad Commissioners of Massachusetts, in the case of the petition of the selectmen of Sturbridge for reduced fares on the Worcester Consolidated Street Railway, has ruled as follows:

"At the present time the 5-cent fare limit for residents of the village of Fiskdale, in the town of Sturbridge, who desire to travel eastbound over the line of the Worcester Consolidated Street Railway is located at Fairview Park, about 1 mile east of Sturbridge Center, and a second 5-cent fare is necessary to ride from that point to the American Optical Works in Southbridge. The petitioners ask that the fare between Fiskdale and Southbridge for regular patrons of the road during certain hours be reduced to 5 cents.

"After a public hearing and a careful consideration of the claims of the petitioners and of the company, the board does not feel warranted in recommending that the present rate of fare be reduced one-half; but, in view of the distance traveled and other considerations, the board believes that the present rate of fare is unduly burdensome to residents of Fiskdale who are obliged to travel daily to and from their place of employment in Southbridge, and recommends that the company make some concessions between the hours of 5.30 and 7 a. m. and 5 and 6.30 p. m. in the fare now charged by the sale of tickets at a lower rate per ride to the regular patrons of the railway between Fiskdale and Southbridge.

"The board also believes it desirable, where the distances are not excessive, that there should be a single-fare limit from center to center of adjoining towns. As there is no public park at or near Fairview Park, and no other conditions conducive to a relatively large amount of travel to and from that point, the board recommends that the present fare limit be extended westerly from Fairview Park to Sturbridge Center, so as to enable passengers to ride between that point and the American Optical Works in Southbridge for a single 5-cent fare."

In the case of the petition of the selectmen of Southbridge relative to the extension of the fare limits on the Worcester Consolidated Street Railway in that town the board has ruled as follows:

"The petitioners ask for the establishment of additional transfer privileges and an extension of the present fare limits on the Worcester Consolidated Street Railway in the town of Southbridge.

"Upon the recommendation of the board, the company has granted passengers traveling westward on its main line free transfers in the town of Southbridge to the Sandersdale line similar to those heretofore granted by the company in the reverse direction. The company has thus complied with the request of the petitioners for additional transfer privileges and has made it possible for passengers to ride from and to any point on its line in the town of Southbridge for a single 5-cent fare.

"The petitioners also desire the extension of the fare limit on the company's line in Southbridge to the corner of Mechanic and Worcester Streets. The fare limit is now located in the business center of the town, near the property of the American Optical Company.

"In an order recently issued upon the petition of the selectmen of Sturbridge, the board has extended the westerly fare limit on this line a distance of nearly a mile, to Sturbridge Center. At the present time, therefore, passengers may ride between the center of Southbridge and the center of Sturbridge, a distance of about 5 miles, or between any two points within the town of Southbridge for a single 5-cent fare. In so far as it is possible to lay down any general principles in regard to fare limits upon street railway lines, the present arrangement of fare limits in the town of Southbridge is in accord with the general policy of the board.

"As no evidence was presented of any unusual local conditions which would warrant the board in applying any different principle in this case, the petition, so far as it relates to an extension of present fare limits in the town of Southbridge, is dismissed."

In the case of the petition of the selectmen of Leicester relative to an extension of the fare limits on the Worcester Consolidated Street Railway in the town of Leicester the commission has ruled as follows:

"The first fare limit for outbound passengers on the Worcester-Spencer line of the Worcester Consolidated Street Railway is at the city line, so-called, between Worcester and Leicester. The petitioners ask that this fare limit be extended a distance of about 1 mile to McDermott's store at Main and Chapel Streets in that portion of Leicester known as Cherry Valley. For the accommodation of the residents of the village of Cherry Valley the company now provides special tickets by means of which patrons of the railway may ride from McDermott's store to the city line for a fare of 2½ cents, or to any part of Worcester, by the use of a free transfer at City Hall, for a fare of 7½ cents. The extension of fare limits requested by the petitioners would be, in effect, a reduction from 7½ cents to 5 cents in the rate now charged between the village of Cherry Valley and Worcester.

"The present rate of fare between Cherry Valley and the city of Worcester does not appear to be excessive as compared with other rates charged by the company on other portions of this line as well as on the other lines of its railway system. If this petition were granted other communities served by the railway would be entitled to receive a similar extension of the present fare limits. The board does not believe that the company's net income is sufficiently large to justify the board in making a recommendation in the present case which would be likely to create a precedent for a general extension of the present fare limits, and a consequent reduction of the operating revenues, upon the various railway lines of the company.

"The board, however, is of the opinion, in view of the close business and social relations between the village of Cherry Valley and Worcester, that the company may well make some concession in the present fares between these points. In Cherry Valley there are several mills which give employment to a large number of persons residing either in Cherry Valley or in Worcester. Many other residents of Cherry Valley are employed in various mills and factories in Worcester. A large number of working people, therefore, travel regularly between Cherry Valley and Worcester. For the benefit of these regular patrons of the road the board recommends that the company, in addition to maintaining existing fares, shall issue some form of identification ticket or other special ticket, without transfer privileges, which shall enable passengers, during certain hours in the morning and afternoon, to ride between McDermott's store in Cherry Valley and City Hall in Worcester for a 5-cent fare."

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**Reduction in Fare Ordered in California.**—The Railroad Commission of California has declared the passenger rates of the Los Angeles & San Diego Beach Railway, San Diego, Cal., unjust and has ordered certain reductions.

**Through Freight Rate Ordered in California.**—In the case of the Modesto & Empire Traction Company, Modesto, Cal., versus the Atchison, Topeka & Santa Fe Railway the Railroad Commission of California has ordered joint through rates on freight, but not on passengers.

**Reduction in Fare by Long Island Road.**—By order of the Public Service Commission of the Second District of New York the New York & Long Island Traction Company, Hempstead, N. Y., has reduced the local cash fare in both directions between Pleasant Street, Roosevelt, and the Long Island Railroad crossing between Sixth and Seventh Streets, Garden City, from 10 cents to 5 cents.

**Philadelphia-Norristown Line Opened.**—The Philadelphia & Western Railway, Upper Darby, Pa., has placed in operation its new service between Sixty-ninth and Market Streets, Philadelphia, and Norristown, Pa., the company having completed its 6½-mile extension from Villa Nova to Norristown. At Norristown connection is made with the lines of the Lehigh Valley Transit Company. It is planned to operate through service between Allentown and Philadelphia.

**Temporary Suspension of Traffic in Syracuse.**—On account of an accident on Sept. 1, 1912, to the Niagara Falls transmission line between Weedsport and Mortimer, just outside of Rochester, N. Y., the service of the Syracuse Rapid Transit Company was interrupted. Altogether power was off about four hours, but the reserve plants of the Syracuse Lighting Company were placed in service and the railway company was enabled to move its Dudley, Auburn and Oneida cars. With the exception of the Rochester, Syracuse & Eastern Railway all of the lines of the Beebe syndicate were affected.

**Ohio Commission Orders Steam and Electric Roads to Provide for State Fair Crowds.**—The Public Service Commission of Ohio on Aug. 27, 1912, ordered both the steam railroads and electric railways to secure sufficient equipment to accommodate the crowds which assembled in Columbus to attend the State fair and the centennial celebration of the city. The Columbus Railway & Light Company was instructed as to the manner in which the crowds were to be handled, while the Columbus, Delaware & Marion Railway was requested to borrow cars from the Cleveland, Southwestern & Columbus Railway in case it found it could not handle traffic properly with its own equipment.

**Controversy in Regard to Seats for Motormen.**—The South Covington & Cincinnati Street Railway, Covington, Ky., and the municipal authorities of Newport, Ky., the twin city of Covington, across the river from Cincinnati, Ohio, are at odds in regard to the rules which shall govern the operation of the company's cars. The Newport Council has passed an ordinance ordering that street railway motormen in Newport be allowed to use stools while running their cars. A suit has been filed in the Campbell Circuit Court to test the legality of the ordinance. The company maintains that, as traffic on Newport's streets is very heavy, it would be dangerous to seat motormen, particularly as the cars are not equipped with air brakes.

**Decision in New Haven Wage Arbitration.**—Judge W. S. Chase of the Superior Court of Connecticut as the deciding arbitrator in the wage negotiations between the employees of the Connecticut Company in New Haven and the company has declared that the men in New Haven are not entitled to a higher wage scale than is paid employees on other divisions of the company. Judge Chase agrees with Clarence Deming, who represented the company, while Attorney D. E. Fitzgerald, representing the men, filed a minority report. The latter contends that the employees in New Haven are entitled to a higher wage scale. The New Haven men demanded a flat rate of 30 cents an hour. The men on the other divisions are paid on a sliding scale from 22 cents to 27½ cents an hour.

**Record Excursion Traffic on Aurora, Elgin & Chicago Railroad.**—The Aurora, Elgin & Chicago Railroad, Chicago, Ill., recently handled one of the largest excursions in its history. The party included approximately 5000 members of the benefit association which includes the employees of The Fair, Chicago, a department store, and the outing was held at Glenwood Park, 40 miles west of Chicago. Sixty-three passenger coaches were required to handle the traffic. The cars were made up in twelve special trains, consisting of three six-car and nine five-car trains. The first of the party left Chicago at 8:15 a. m., and the last outgoing train left the Fifth Avenue terminal, Chicago, at 1:15 in the afternoon. On the return the trains were run at intervals between 4:40 p. m. and 9:40 p. m.

**Claim Department of Chicago Railways Replies to Criticisms.**—In a long letter contributed to the Chicago daily press under date of Aug. 27 Sidney Ossoski, general claim agent of the Chicago (Ill.) Railways, replied at length to several criticisms which had been made to the relief-for-accidents service conducted by his company. He pointed out that the service includes relief to persons injured by the cars, whether the company is liable for the damage or not; that knowledge of accidents is not kept from the police, and that the company does not interfere with the control of the case where the person has been attended to before its ambulance arrives. It has received no complaints as to the treatment received, but has had a great many letters of appreciation from persons who have been assisted. He also refers to the system of accident insurance abroad where employers' associations have voluntarily established dispensaries and hospitals for the treatment of persons hurt in accidents for which they have been or may have been responsible.

# Personal Mention

**Mr. L. H. Palmer, Jr.,** assistant superintendent of transportation of the New York (N. Y.) Railways Company, was married last week to Miss Grace E. Burroughs, of Somerville, Mass.

**Mr. E. W. Burgis** has been promoted to the office of superintendent of construction with the New Orleans Southern & Grand Isle Railway and the Algiers Railway & Lighting Company, New Orleans, La.

**Mr. H. D. Sanderson,** engineer of maintenance of way of the Michigan United Traction Company, has been appointed chief engineer of the company to succeed Mr. M. S. Ralls, resigned. Mr. Sanderson will have his headquarters at Jackson, Mich.

**Mr. Thomas McLean** has been appointed chief clerk to Mr. C. H. Chapman, superintendent of the Bridgeport lines of the Connecticut Company. He succeeds Mr. George C. Wilson, who as noted elsewhere in this column has become connected with the United Railways & Electric Company, Baltimore, Md.

**Mr. Martin J. Insull,** general manager of the Louisville & Northern Railway & Lighting Company, New Albany, Ind., has removed his headquarters to Chicago. Mr. Insull is vice-president of the Middle West Utilities Company and has taken offices with that corporation. He will retain his connection with the public utilitiy companies at New Albany.

**Mr. Thomas K. Bell,** formerly chief engineer of the Interstate Railways, Philadelphia, Pa., has been appointed general manager of the St. Petersburg Light & Power Company and the St. Petersburg Railroad & Gulf Railway, St. Petersburg, Fla., and entered upon his new work on Sept. 2. Mr. Bell was for many years engineer of William Wharton, Jr., & Company, Inc., Philadelphia, and recently has been doing some special engineering work for the Philadelphia (Pa.) Rapid Transit Company.

**Mr. S. M. L. McSpadden,** whose appointment as general superintendent and traffic manager of the Grand Junction & Grand River Valley Railway, Grand Junction, Col., and general superintendent of the Grand Junction Electric, Gas & Manufacturing Company, was noted in the Electric Railway Journal of Aug. 17, 1912, has been connected with these companies for more than three years in various capacities, beginning as purchasing agent. He was subsequently appointed general freight and passenger agent and assistant to the president and general manager, and more recently has served as assistant general superintendent. Prior to going with the above companies he was general purchasing agent for the Central & Eastern Colorado Power Companies and had his headquarters in Colorado Springs and Denver.

**Mr. Robert W. Foresman,** whose appointment as superintendent of power of the Des Moines (Ia.) City Railway was noted in the Electric Railway Journal of Aug. 24, 1912, was engaged prior to 1903 in mechanical engineering, mostly with the American Strawboard Company, of Circleville, Ohio. In 1903 Mr. Foresman became connected with the Columbus (Ohio) Railway & Light Company. At that time this company was rehabilitating its Spring Street power station and increasing its capacity so as to bring most of the generating work under one station. He left Columbus in 1905 to go to Portland, Ore., where he remained but a few months, returning to the East to enter the service of the St. Joseph (Mo.) Railway, Light, Heat & Power Company. Mr. Foresman was made chief engineer of the power station of that company and later was also placed in charge of the outside steam-heating work.

**Mr. George C. Wilson** has resigned as chief clerk to Mr. C. H. Chapman, superintendent of the Bridgeport lines of the Connecticut Company, to become assistant to Mr. J. A. Stoll, traffic agent of the United Railways & Electric Company, Baltimore, Md. Mr. Wilson is a native of Thompsonville, Conn., and entered the railroad business with the Boston & Albany Railroad in 1894, staying four years with that company and then becoming assistant superintendent of the Enfield & Longmeadow Electric Railway, with which he remained for three years. For the seven following years he was general storekeeper for the Connecticut Railway & Lighting Company, having charge of all of the stores for the company in Connecticut. Four years ago he became chief clerk to Mr. Chapman, the property of the Connecticut Railway & Lighting Company having meanwhile been taken over by the Connecticut Company. A dinner was tendered to Mr. Wilson by his associates in the Connecticut Company and an alligator traveling bag was presented to him by his associates in the company as a token of their esteem.

**Mr. I. B. Clarke,** who has resigned as superintendent of the New York & Long Island Traction Company, Hempstead, Long Island, N. Y., has had quite an extensive experience in electric railway work. After he was graduated from Cornell University, where he took a special course in electrical enginering, Mr. Clarke went to Atlanta, Ga., where he worked for six years in the shops of the Georgia Railway & Electric Company, as repairman, car wireman, assistant foreman and foreman of inspection and repair shops. He left Atlanta to accept a position with the Westinghouse Air Brake Company as air-brake expert, commercial engineer and representative at Cincinnati, Ohio, and in charge of that office. Three years later he resigned to become associated with the Brooklyn Rapid Transit Company, and for two years he was supervisor of motormen on the elevated lines of that company and had charge of the training and educating of new and old men in the proper handling of elevated trains. The final year he was supervisor of elevated and surface car motormen and put in service a system of instruction on the surface lines which resulted in a marked reduction in the number of accidents. He was then appointed assistant superintendent of the elevated lines of the Brooklyn Rapid Transit Company and held this position for about two and one-half years, when he resigned to accept the position of superintendent of the New York & Long Island Traction Company, in Hempstead, L. I., and superintendent of the Long Island Electric Railway Company at Jamaica, L. I., where he had charge of shops, track, line, car stations and substations and transportation.

**Mr. Charles W. Ford,** who resigned as general superintendent of the Grand Junction & Grand River Valley Railway and the Grand Junction Electric, Gas & Manufacturing Company, Grand Junction, Col., effective on Sept. 1, has been appointed general superintendent of the New Orleans Southern & Grand Isle Railway and the Algiers Railway & Lighting Company with headquarters in New Orleans, La. Mr. Ford entered the electric field in 1892 after receiving a high school education. He engaged at first with the Thomson-Houston Company, which was then installing lighting plants in the South. In 1893 he was made superintendent of a lighting plant in northern Alabama. Mr. Ford resigned from this position in 1894 to enter the service of the New Orleans Traction Company, which was then electrifying its lines. He remained with this company until about the middle of 1895, when he accepted a position with the Galveston (Tex.) City Railway, continuing with the company in various capacities until January, 1900, when he resigned to become manager of a lighting plant in Central Texas. He returned to the Galveston City Railway in January, 1901, as superintendent and remained with the company until October, 1902, when he accepted a position with the Metropolitan Railway Company, Oklahoma City, as superintendent of construction and operation. When the Oklahoma City Railway succeeded the Metropolitan Railway Mr. Ford retained his position and was engaged more extensively in construction and in conducting the operation. The Oklahoma Railway was finally organized to succeed the old company and Mr. Ford was made general superintendent in charge of construction and operation. He continued in this capacity until January, 1910, when the growth of the system made it necessary to separate the departments and he was relieved of construction and placed in charge of operation. He retired from the company in November, 1910, and in 1911 became connected with the Grand Junction companies. Mr. Ford will have charge of operation and maintenance and passenger and freight traffic with the New Orleans Southern & Grand Isle Railway and the Algiers Railway & Lighting Company. He succeeds Mr. R. S. Stearnes in these companies. Mr. Stearnes had the title of superintendent.

# Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

## RECENT INCORPORATIONS

***Southern California Beach Railway, Santa Ana, Cal.**—Application for a charter has been made in California by this company to build a 150-mile electric or steam railway between Colton, Riverside, Santa Ana, Balboa, Laguna Beach, San Juan, Capistrano, Oceanside and San Diego. Headquarters, Santa Ana. Capital stock, $3,000,000. Directors: M. L. Cook, H. C. Foster, M. Smithwick, C. R. Sumner and W. D. Gilman, all of Los Angeles.

**Central & Western Illinois Traction Company, Canton, Ill.**—Incorporated in Illinois to build an electric railway from Pekin to Peoria through the counties of Tazewell, Peoria, Fulton, McDonough and Hancock to Hamilton, and from there to Keokuk, Ia. Capital stock, $200,000. Incorporators and first board of directors: J. T. Adams, Columbus, Ohio; C. P. Williams, Chicago; A. L. Ralston, Grove City, Ohio; W. R. Curran, Pekin, Ill.; Lon M. Ash, Canton, Ill.; Calvin G. Formhals and Bert C. Huddleson, Smithfield, Ill. [E. R. J., Aug. 17, '12.]

***Orange & Northeastern Railway, Austin, Tex.**—Incorporated in Texas to build a 126-mile electric or steam railway from White City to Burkeville, via Sabine and Newton Counties, thence to a point on the Sabine River; also for a line from Orange to Nibletts Bluff, La., and Center. Capital stock, $100,000. Incorporators: Edward Kennedy, Carey Shaw, J. C. Simmons, Houston; George B. Holland, F. H. Farwell, James B. Sargent and G. M. Sells, all of Orange.

## FRANCHISES

**Birmingham, Ala.**—The Birmingham Railway, Light & Power Company has received a franchise to double-track its South Fifteenth Street line in Birmingham.

**San Diego, Cal.**—The San Diego Electric Railway has received a forty-year franchise from the Council to extend its line to Old Town.

**Hartford, Conn.**—The Connecticut Company has asked the Council for permission to double-track and extend some of its lines in Hartford.

**East St. Louis, Ill.**—The Alton & Southern Railroad has asked the Council for a franchise to operate with electricity or steam over Forty-second Street, St. Clair Avenue, Summit Avenue, College Avenue and State Street in East St. Louis.

**Genoa, Ill.**—The Woodstock & Sycamore Traction Company has asked the Board of Aldermen for a franchise in Genoa.

**Jerseyville, Ill.**—The City Council has voted to repeal the ordinance passed in 1905 granting a franchise to the Alton, Jacksonville & Peoria Railway to operate its line on the streets of Jerseyville. F. L. Butler, receiver for the line, has served legal notice upon Mayor J. M. Page not to remove the tracks which are now laid in the city.

**South Bend, Ind.**—The Chicago, South Bend & Northern Indiana Railway has asked the Council for a franchise to double-track the south side Mishawaka line on Vistula Avenue between Sample Street and Springbrook Park in South Bend.

**Springfield, Mass.**—The Springfield Street Railway has received a franchise from the Council to double-track its line on Main Street, Springfield.

**Grosse Point, Mich.**—William Tait, Charles E. Beymer and Dudley W. Abbott have received a thirty-year franchise from the Council to operate electric or gasoline cars from the Detroit Terminal belt line at Mack Avenue to the northeasterly boundary of Grosse Point. This line is part of the proposed interurban line to extend through the Thumb district. [E. R. J., June 8, '12.]

**Mohawk, N. Y.**—The Public Service Commission, Second District, has approved the applications of the Utica & Mohawk Valley Railway to exercise franchises for the construction of a double-track line through German Flats, Mohawk and Ilion.

**Portland, Ore.**—George F. Huesner has asked the Council for a franchise for an electric line in Portland.

**Ennis, Tex.**—The Southern Traction Company has received a franchise from the Council in Ennis.

**Waco, Tex.**—The Southern Traction Company, Dallas, has received a franchise from the Council to build a bridge over the Brazos River.

**Salt Lake City, Utah.**—The Utah & Salt Lake Electric Railway has received a franchise from the Council over certain streets in Salt Lake City.

**Charlottesville, Va.**—The Charlottesville & Albemarle Railway has asked the Board of Supervisors of Albemarle County for a franchise to extend its Main Street line from the present terminus through College and Ivy Road as far as the head of the Rugby Road.

**Bellingham, Wash.**—The Stone & Webster interests have asked the City Council for a franchise to the city limits of Bellingham over Guide Meridian Street, a distance of 2 miles.

**Seattle, Wash.**—The Puget Sound Traction, Light & Power Company has asked the Council for a franchise to extend its Kinnear Park line on Tenth Avenue West from West Crockett Street to West Wheeler Street in Seattle.

**Elkhorn, Wis.**—The Badger Railway & Light Company, Milwaukee, has asked the City Council for a franchise in Elkhorn.

## TRACK AND ROADWAY

***Los Angeles, Cal.**—The Los Angeles Investment Company plans to build an electric railway from Los Angeles to the beach at Venice.

**Pacific Electric Railway, Los Angeles, Cal.**—This company plans to rehabilitate the Santa Barbara Street Railway. The work will be in charge of John C. Breckenridge.

**Geary Street Municipal Railway, San Francisco, Cal.**—This company has completed its double-track line from Thirty-third Avenue in San Francisco to the west side of Kearny Street in Geary.

**New London & East Lyme Street Railway, New London, Conn.**—Plans have been completed by this company to begin construction soon on its line from Niantic to the Connecticut River.

**Columbus, Chattahoochee Valley & Gulf Railway, Columbus, Ga.**—Surveys have been begun by this company on its 180-mile interurban railway between Columbus and Atlanta. It is not decided yet whether steam or electric power will be used. John D. Little, Atlanta, is interested. [E. R. J., May 11, '12.]

**La Salle County Electric Railway, Chicago, Ill.**—This company has completed the financing of its railway from Ottawa to Mendota, Earlville, Sandwich and Somonauk, a total of 92 miles. Material for the first 12 miles of track has been purchased. Work has been begun between Ottawa and DeKalb. George H. Dodge, Chicago, president. [E. R. J., Aug. 17, '12.]

**Southern Illinois Railway & Power Company, Chicago, Ill.**—This company proposes to begin work at once on its 17-mile electric railway to connect Eldorado, Wasson, Harrisburg, Dorrisville, Muddy, Leedford and Carrier Mills. It will ultimately be extended to a 100-mile line. The company will furnish power for lighting purposes and its power station will be located at Muddy. It will operate ten cars. Capital stock authorized, $1,600,000. Bonds authorized, $1,000,000. All communications are referred to W. H. Schott & Company, Chicago. [E. R. J., July 27, '12.]

**Kankakee & Urbana Traction Company, Kankakee, Ill.**—At a recent meeting of the board of directors of this company the following officers were elected: George M. Bennett, president; Ira F. Palmer, vice-president; H. I. Green, general attorney; George K. Linton, secretary; G. H. Parker, treasurer. [E. R. J., Jan. 20, '12.]

**Creston, Winterset & Des Moines Railroad, Creston, Ia.**—Work has been begun by this company on its line between Creston and Macksburg. R. Brown, Creston, president. [E. R. J., Aug. 24, '12.]

**Kentucky Southwestern Railway, Light & Power Company, Hickman, Ky.**—An extension of an interurban electric railway which has been planned in Southwestern Kentucky by this company is being contemplated from Mayfield to Murray. The company has completed all unfinished portions of its final location surveys under the management of W. A. Calhoun. Lines connecting Paducah, Mayfield, Owensboro and many other points are to be built. [E. R. J., Aug. 24, '12.]

**Louisville (Ky.) Railway.**—Plans are being considered by this company to extend its city lines to a point a short distance beyond Audubon Park.

**Owensboro (Ky.) City Railroad.**—This company plans to extend its Crittenden Street line in Owensboro west of the city to the Hickman and Ebbert addition.

**Winnipeg (Man.) Electric Railway.**—Arrangements have been made by this company for the purchase of the right-of-way of an extension as far as Stony Mountain.

***Kalamazoo-Grand Rapids Electric Railway, Kalamazoo, Mich.**—This company has awarded a contract for the construction of its line between Kalamazoo and Grand Rapids, via Plainwell and Martin, to J. N. Bick, Toledo. This line will be a subsidiary of the Michigan United Traction Company.

**Duluth (Minn.) Street Railway.**—The laying of rails on this company's extension from Duluth to New Duluth will be begun during the middle of October.

**Laurel Electric Light & Power Company, Laurel, Miss.**—Work will be begun at once by this company on the extension of its lines into the business district of Laurel.

**St. Louis & Western Traction Company, St. Louis, Mo.**—Work has been begun by this company on its right-of-way between the city limits of St. Louis, at the southwest corner of Forest Park and Denny Road, north of Kirkwood. Ultimately this line will be extended to the Missouri River, via Valley Park, Manchester and Ballwin. J. D. Houseman is interested. [E. R. J., Aug. 3, '12.]

**International Railway, Buffalo, N. Y.**—Many improvements are planned by this company on its track and roadbed in several parts of Buffalo. The most important is the placing of new rails on Niagara Street and its continuation.

**Ithaca-Cortland Traction Company, Ithaca, N. Y.**—This company has begun the construction of its 29-mile electric railway to connect Ithaca and Cortland, via Freeville, Forest Home, Dryden and McLean. Hugh E. Crilly, Allentown, Pa., is the general contractor and P. R. Kiely, Syracuse, N. Y., is the sub-contractor. The contract for rails has been awarded to the Lackawanna Steel Company. The company will furnish power for lighting purposes and will operate eight cars. The power house will be located at Freeville or Dryden. Capital stock authorized, $750,000 common and $250,000 preferred. Capital stock issued, $67,000 common and $250,000 preferred. Bonds authorized, $650,000. Bonds issued, $650,000. Officers: Paul K. Clymar, Ithaca, N. Y., president; Howard L. Chandler, Philadelphia, Pa., vice-president; Seymour S. Preston, Philadelphia, secretary and treasurer, and Weeks & Sanville, Hale Building, Philadelphia, chief engineers. [E. R. J., Aug. 17, '12.]

**Long Island Railroad, New York, N. Y.**—Announcement has been made by this company that the electric service on the Whitestone Division will be inaugurated on Oct. 22.

**Schenectady (N. Y.) Railway.**—Extensive plans are being made by this company to build several extensions, one through the Eleventh Ward and the other in the vicinity of Carman.

**Piedmont & Northern Railway, Charlotte, N. C.**—This company's line into McAdenville has been placed in operation.

***Raleigh, N. C.**—Benjamin N. Duke, George Lyon, Buchanan Lyon and Jones Fuller have applied to the State for a charter to operate an electric railway and a light plant in Durham.

**Cleveland & Sharon Electric Railway, Cleveland, Ohio.**—Recently new capital has been interested in the project to build an electric railway between Sharon, Pa., and Cleveland, Ohio. It is understood that work will be begun as soon as the necessary capital is secured.

**Northern Ohio Traction & Light Company, Akron, Ohio.**—Plans are being considered by this company to make numerous improvements to its lines in Akron, Canton and several other cities.

**Toledo, Defiance & Fort Wayne Railway, Defiance, Ohio.**—This company has completed surveys, secured most of the right-of-way and will begin construction as soon as it has secured financial backing for its line to connect Fort Wayne, Antwerp, Paulding, Defiance, Napoleon, Liberty Center and Toledo. Capital stock authorized, $3,500,000. T. C. Jack, Defiance, secretary and treasurer.

**Lake Erie & Northern Railway, Brantford, Ont.**—Contracts are to be awarded about Sept. 15 to build this company's line from Brantford to Port Dover and Galt. The maximum grades will be 1 per cent, maximum curvature 6 deg. There will be two steel bridges, one 450 ft. long and the other 438 ft. long. John Muir, Brantford, president. [E. R. J., Jan. 14, '12.]

**London (Ont.) Railway.**—This company is now building a new line in the north end of London. Two short sections in the downtown district are also to be double tracked.

**Dunnville, Wellandport & Beamsville Electric Railway, Wellandport, Ont.**—Financial arrangements are said to have been completed by this company and construction will soon be begun on the section of its line between Dunnville and St. Anns. This line will connect Dunnville, Wellandport, St. Anns and Beamsville. [E. R. J., June 29, '12.]

**Klamath Falls, Ore.**—Preliminary surveys have been made and most of the right-of-way obtained for the 26-mile electric railway from Klamath Falls to Bonanza, via Ewaunda Lake, Merrill and Olene. George C. Clark, Everett, Wash., is interested. [E. R. J., June 29, '12.]

**Bloomsburg, Millville & Northern Railway, Bloomsburg, Pa.**—During the next few weeks this company will award contracts to build 8 or 9 miles of new track with 60-lb. T-rails. The company will also build a concrete dam and bridges.

**Montgomery County Rapid Transit Company, Norristown, Pa.**—This company has placed in operation its line to Skippackville and Harleysville.

**West Penn Railways, Pittsburgh, Pa.**—Bids for the construction of this company's new 9½-mile extension from Hecla to Latrobe are to be submitted at once and construction will soon be begun.

**Chattanooga Railway & Light Company, Chattanooga, Tenn.**—This company has been asked to consider plans for an extension of its St. Elmo Avenue line to Flintstone, Ga.

**Knoxville Railway & Light Company, Knoxville, Tenn.**—Surveys are being made and construction will soon be begun by this company on the extension of its Kingston Pike line and the extension of its South Knoxville line west to Vestal.

***Knoxville, Tenn.**—An electric railway between Knoxville, Tenn., and Mascot, a few miles distant, is being planned. The line is to aid in the development of the American Lead, Zinc & Smelting Company, Mascot, and will probably be built by the Knoxville Railway & Light Company.

**Nashville Railway & Light Company, Nashville, Tenn.**—Grading is being done and construction will soon be begun by this company on the double-track extension of its line to Shelby Park, via Fatherland Street, where the tracks will be looped so as to meet the present terminus of the line on Shelby Avenue.

**Texas Light & Power Company, Dallas, Tex.**—It is reported that this company will build an electric railway over certain streets in Dallas. W. B. Head, Dallas, superintendent.

**Fort Worth, Mineral Wells & Northwestern Railway, Fort Worth, Tex.**—A proposition has been made this company by the Mercantile Trust Company, St. Louis, that it will furnish the money to build this line between Fort Worth and Mineral Wells if the people of Fort Worth and Mineral Wells will raise in preferred 7 per cent stock the sum of $529,000. The trust company also insists on naming the first board of directors: S. Davidson, M. E. Finney, W. J. Bailey, John Scharbauer, W. G. Newby and W. E. Brown. [E. R. J., June 15, '12.]

**Houston (Tex.) Electric Company.**—An announcement has been made by this company that an expenditure of $1,000,000 will be made this year in the improvement of its railway system. Among the improvements planned will be the double-tracking on the Louisiana and Houston Avenue lines, the reconstruction of the San Felipe, the Woodland Heights, Brunner Heights and La Branch lines and the construction and extension of lines into new territory.

**Bay Shore Rapid Transit Company, La Porte, Tex.**—Plans have been completed and preliminary surveys made by this company for its line to connect La Porte, Sylvan Beach, Seabrook, Webster, Friendsfood and Pearland. It is planned to operate gasoline motor cars and to locate its repair shops in Houston. F. S. George, Dayton, Ohio, is interested. [E. R. J., April 27, '12.]

**Ogden (Utah) Rapid Transit Company.**—Preparations are being made by this company to build an extension from Ogden to Huntsville. The company has received the consent of the County Commissioners to change the original route of this branch for a short distance.

**Utah Light & Railway Company, Salt Lake City, Utah.**—Surveys have been begun by this company for the extension of its 8-mile line from Salt Lake City to Bountiful.

**Utah & Salt Lake Electric Railway, Salt Lake City, Utah.**—This company has awarded a contract to the A. J. Orem Company, Salt Lake City, for the construction of its 61-mile electric railway between Salt Lake City and Payson, via Sandy, Draper, Murray, Lehi, Provo, Spanish Fork and Springville. Abel J. Evans is interested. [E. R. J., July 13, '12.]

**Rutland Railway, Light & Power Company, Rutland, Vt.**—A 1½-mile extension will be built by this company between Lake St. Catherine and Poultney in the near future.

**Kittitas Railway & Power Company, Cle Elum, Wash.**—Plans are being made by this company to begin soon the construction of its 31-mile line to connect Cle Elum, Roslyn and Salmon La Sac. Paul L. Richards, Tacoma, president. [E. R. J., May 4, '12.]

**Puget Sound Traction, Light & Power Company, Seattle, Wash.**—Plans are being considered by this company to build an extension of its East Union Street line from its present terminus to Thirty-fourth Avenue in Seattle.

**City & Elm Grove Railway, Wheeling, W. Va.**—An extension to Park View is under consideration by this company.

**Janesville Traction Company, Janesville, Wis.**—Plans are being considered by this company to extend its lines in Janesville to a point midway between the Oak Hill and Mount Olivet cemeteries.

**Milwaukee Electric Railway & Light Company, Milwaukee, Wis.**—Following the granting of the right-of-way by numerous property owners on Eighth and Oklahoma Avenues in Lake, Wis., work will be begun by a subsidiary of the Milwaukee Electric Railway & Light Company at once on the extension of a short line from Eighth Avenue to Fifteenth Avenue on Oklahoma Avenue.

## SHOPS AND BUILDINGS

**Phoenix (Ariz.) Railway.**—Work will soon be begun by this company on a new office building on Washington Street and Second Avenue, in Phoenix. The structure will be four stories with a frontage of 150 ft. on Washington Street. It is proposed to make one-half of the building for the central transfer station and the other half for office and storage purposes.

**San Diego (Cal.) Electric Railway.**—During the next few weeks this company plans to begin the construction of a new brick machine shop in San Diego. The structure will be 125 ft. x 196 ft. and two stories high.

**Pacific Electric Railway, Los Angeles, Cal.**—This company has awarded a contract for the construction of a new substation at Burbank to the Richards-Neustadt Construction Company, Wright & Callender Building, Los Angeles. The structure will be 40 ft. x 51 ft. and of reinforced concrete construction.

**La Salle County Electric Railroad, Chicago, Ill.**—A new carhouse will be built by this company in Prairie Center in the near future.

**Mason City & Clear Lake Railway, Mason City, Ia.**—A new passenger and freight station will be built by this company in the near future. Its yards and stub line will be extended to the plant of the Iowa Sugar Refining Company.

**Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.**—A new terminal will be built at once by this company and the Electric Short line on a triangular block bounded by Seventh Street, Third Avenue and Holden Street in Minneapolis. The structure will be five stories. The first floor will be used for car terminals, lobby, waiting rooms and ticket offices. The other floors will house the offices of the two lines.

**Trenton & Mercer County Traction Corporation, Trenton, N. J.**—This company has completed its new five-track carhouse, 350 ft. x 50 ft., and is now building an additional one, 42 ft. x 200 ft., in Trenton.

**Bloomsburg, Millville & Northern Railway, Bloomsburg, Pa.**—During the next few weeks this company expects to build new carhouses in Bloomsburg.

**Philadelphia (Pa.) Rapid Transit Company.**—Work has been begun by this company on its new carhouse on Luzerne Street, Philadelphia. The structure will be 227 ft. x 339 ft., one story and of steel and concrete construction. The contract for the building has been awarded to the Unity Construction Company, St. Louis. In addition to the new carhouse the company has under way the erection of two other structures. About $6,000 will be expended on the construction of these other buildings, which are to be of brick, and serve as quarters for repair crews. Other additions are to be put up by the company adjacent to the site of the new carhouse.

**Rhode Island Company, Providence, R. I.**—Plans are being made by this company to construct a new substation on Dike Street in Olneyville. The structure will be of brick. The cost is estimated to be about $20,000.

**Corpus Christi Street & Interurban Railway, Corpus Christi, Tex.**—Contracts will be awarded at once by this company for the construction of an addition to its carhouse in Corpus Christi.

## POWER HOUSES AND SUBSTATIONS

**La Salle County Electric Railway, Chicago, Ill.**—This company plans to build its new power house in Prairie Center.

**Louisville & Interurban Railroad, Louisville, Ky.**—This company has awarded a contract for the construction of the superstructure of its new $750,000 power house at Nineteenth and High Streets in Louisville to the Henry Bickel Company. The power house, which is of reinforced concrete, brick and steel, is to be in two sections, one covering ground 86 ft. x 178 ft. and the other 97 ft. x 179 ft. The roof will be 70 ft. above the ground at its highest point. The structure is to cost approximately $300,000 and its equipment, most of which has been contracted for, will cost an additional $450,000. The building is now well under way.

**Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.**—This company's substation at Pass Christian was destroyed by fire on Aug. 24.

**Vicksburg (Miss.) Traction Company.**—Excavations have been begun by this company for the construction of a new power house in Vicksburg.

**Trenton & Mercer County Traction Corporation, Trenton, N. J.**—This company has now under construction an addition to its power house and will install a 1500-kw De Laval turbo-generator set.

**Austin (Tex.) Street Railway.**—Material has been ordered and construction will soon be begun by this company on an extension to the new municipal dam at Austin.

**Corpus Christi Street & Interurban Railway, Corpus Christi, Tex.**—Contracts will be awarded at once by this company to build a new power house in Corpus Christi. It expects to purchase a 150-kw d.c. generator direct-connected to a 240-hp non-condensing engine with necessary accessories, including switchboard. The boiler equipment is to consist of two 200-hp water-tube boilers and the company wants prices within the next two weeks.

# Manufactures and Supplies

## ROLLING STOCK

**Lincoln (Neb.) Traction Company** has ordered one short-broom snow sweeper from the American Car Company.

**Syracuse (N. Y.) Rapid Transit Railway** has ordered two long-broom snow sweepers from the G. C. Kuhlman Car Company.

**Birmingham Railway, Light & Power Company, Birmingham, Ala.,** reported in the Electric Railway Journal of Aug. 24, 1912, as being in the market for several cars, has ordered nine motor and seventeen trail cars from the McGuire-Cummings Manufacturing Company.

**Milwaukee Electric Railway & Light Company, Milwaukee, Wis.,** noted in the Electric Railway Journal of Aug. 10, 1912, as having ordered thirty closed pay-as-you-enter cars from the St. Louis Car Company, has specified the following details for this equipment:

**New York (N. Y.) Railways** has applied to the Public Service Commission, First District, for permission to issue securities to cover the purchase of 320 stepless cars. The 150 stepless cars previously purchased, as mentioned, in the Electric Railway Journal of July 20, 1912, are included in these 320 cars. The New York Railways has ordered from The J. G. Brill Company one storage battery car equipped with Exide batteries.

| | |
|---|---|
| Seating capacity.....52 | Roof .....arch |
| Bolster centers, length, 23 ft. 2 in. | Underframe .....steel |
| | Air brakes.....National |
| Length of body....33 ft. 8 in. | Car trimmings.....bronze |
| Length over bumpers..47 ft. | Curtain material...Pantasote |
| Width over all.....8 ft. 5 in. | Paint ..... Carter |
| Height, rail to floor, 41 5/16 in. | Sanders .....O. B. |
| | Sash fixtures.....St. Louis |
| Floor to trolley base, 8 ft. 1⅛ in. | Seats.....H. & K. |
| | Step treads.....Universal |
| Body .....composite | Trucks ..... Baldwin |
| Interior trim .....oak | Ventilators .....St. Louis |
| Headlining ..... Agasote | |

## TRADE NOTES

**S. I. Wailes, Los Angeles, Cal.,** has been appointed representative on the Pacific Coast for the Johnson Fare Box Company, New York, N. Y., with headquarters in the Trust & Savings Building, Los Angeles. Mr. Wailes is also representative in that territory for the Tool Steel Gear & Pinion Company, Indianapolis Switch & Frog Company, St. Louis Car Wheel Company and the Cincinnati Car Company.

**Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.,** has received the following orders for railway motors: Rio de Janeiro Tramway Light & Power Company, Rio de Janeiro, Brazil, 100 No. 304 motors and 110 K-35-G controllers; Milwaukee Electric Railway & Light Company, Milwaukee, Wis., thirty quadruple equipments of 306 CA-2 motors and K-35-G control; F. H. Walter & Company, Rio de Janeiro, Brazil, two quadruple 101-G motors with K-28 control and three double equipments of 101-G motors with K-10 control.

**Independent Lamp & Wire Company, New York, N. Y.,** has purchased the property of the Heany Company, the Heany Lamp Company and the Heany Fireproof Wire Company and intends to operate these plants, which are located at Weehawken, N. J., and York, Pa. The Independent Lamp & Wire Company also proposes to extend its scope of manufacture to include the type of tungsten lamps authorized under the Karl Farkas patents, meanwhile continuing to manufacture the asbestos insulated fireproof magnet wire, under the trade name of Salamander.

**Hall Railway Signal Company, New York, N. Y.,** has been incorporated in Maine with a capital stock of $5,000,000 to succeed the Hall Signal Company under the reorganization plan for the latter concern. Newman Erb, vice-chairman of the readjustment committee of the Hall Signal Company, has made the following statement: "The reorganization plan gives present stockholders an opportunity to subscribe to $1,250,000 of preferred stock of the new company at 80, and with that subscription they will get an amount of common stock equal to their then holdings. Those who do not avail themselves of such subscription receive 25 per cent in common stock. There will be issued $1,000,000 6 per cent debentures, which are to be used to adjust and pay off floating debt and obligations of the old company. The whole plan has been underwritten. The new company starts off with upward of $500,000 cash in its treasury, with about $600,000 of bills and accounts receivable and other quick assets, and without any floating debt whatsoever. Moreover, it has on hand unfilled orders approximating $2,000,000. Enlargement of the plant at Garwood, N. J., will be undertaken at once."

**General Electric Company, Schenectady, N. Y.,** at a special meeting of the stockholders on Aug. 29 approved the proposition to increase its capital stock from $80,000,000 to $105,000,000. As a result of the ratification of the plan, there will be paid to stockholders of record Dec. 31 next out of surplus earnings a dividend of $30 a share in stock of the company at par. This dividend will call for $23,292,510 of new stock, and will increase the outstanding stock to $100,034,210. The General Electric Company has announced an extensive pension system. It is planned to pension the male employees who have been in the service of the company for twenty or more years and who have reached the age of seventy years, and those female employees who have been with the company a like number of years and who have reached the age of sixty years. Employees may be pensioned if incapacitated for work after the ages of sixty-five for men and fifty-five for women. The pension in all cases will consist of 1 per cent of the average yearly wage for the ten years preceding the employee's retirement, multiplied by the number of years he has been employed by the company. No employee shall receive more than $125 a month. The pension board for the first year is composed of E. W. Rice, Jr., chairman; Marsden L. Perry, F. C. Pratt, G. E. Emmons, W. C. Fish, G. F. Morrison, C. C. Chesney and M. F. Westover.

## ADVERTISING LITERATURE

**L. Zink Adjuster Company, Detroit, Mich.,** is mailing a card which calls attention to the Zink cam adjuster.

**Stone & Webster Engineering Corporation, Boston, Mass.,** has printed in booklet form a description of the White River development, in the Puget Sound district of Washington. This project was designed and constructed by the corporation. The publication contains many illustrations showing the progress of work on the development.

**United States Electric Signal Company, West Newton, Mass.,** is mailing a circular which calls attention to the merits of the United States type K-2 counting block signals. These signals were recently adopted by the Connecticut Company, after exhaustive tests were made by the signal engineers of the New York, New Haven & Hartford Railroad.

**The J. G. Brill Company, Philadelphia, Pa.,** in *Brill Magazine* for August, 1912, presents an illustrated biography of James Dalrymple, president of the Glasgow (Scotland) Municipal Tramways. Among the feature articles are the following: "Conditions Which Govern the Type of Car for City Service, Kansas City, Mo.," "New York Double-Deck Car," "Semi-Convertible Pay-as-You-Enter Cars for Reading, Pa.," "Brill Semi-Convertible Cars for Portland, Maine," "Pay-as-You-Enter Cars for Pueblo, Col.," "Cars for Cumberland, Md."

**General Electric Company, Schenectady, N. Y.,** has issued Bulletin No. 4977, which describes its type MK control apparatus. This apparatus is designed for use where single-car operation predominates and where a uniform acceleration is not of such importance as extreme simplicity. Bulletin No. A4001 describes General Electric oil switches which are intended primarily for use in small and isolated alternating-current plants of voltages not greater than 3300. The bulletin contains connection and dimension diagrams and also useful formulas for use in selecting oil switches. Bulletin No. 4975 is devoted to the synchronism indicator. Bulletin No. 4973 illustrates and describes resistance units for various motor-starting and speed-controlling rheostats. Bulletin A4002 describes the polyphase maximum-watt-demand indicator, type W. The instrument is suitable for recording the maximum load of alternating-current circuits irrespective of power-factor and voltage fluctuations.

CITY AND INTERURBAN CARS AND TRUCKS

# Brill Semi-Convertible Cars With Longitudinal Seats

Not exactly novel, but unusual. The Portsmouth Street Railway and Light Company has recently put into service a number of cars of this type in Portsmouth, Ohio. Four other companies have received Brill semi-convertibles with longitudinal seats within the last few months. This arrangement sacrifices the saving of interior width which is an important feature of the Brill semi-convertible type, but secures fully the advantages of entirely clearing the window spaces in warm weather, the storage of sashes in roof pockets where there will be no glass breakage, and the elimination of unsanitary wall pockets for windows.

The highly practical character of the Brill design is made apparent by its ability to meet unusual requirements as in the cases outlined above. Brill service constantly develops ideas which may work in with your own when you begin to plan for new equipment.

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JOHN STEPHENSON COMPANY, Elizabeth, ..... N. J.
WASON MANUFACTURING CO., Springfield, ..... Mass.
AMERICAN CAR COMPANY, St. Louis, ..... Mo.
G. C. KUHLMAN COMPANY, Cleveland, ..... Ohio
CAMPAGNIE J. G. BRILL, Paris, ..... France

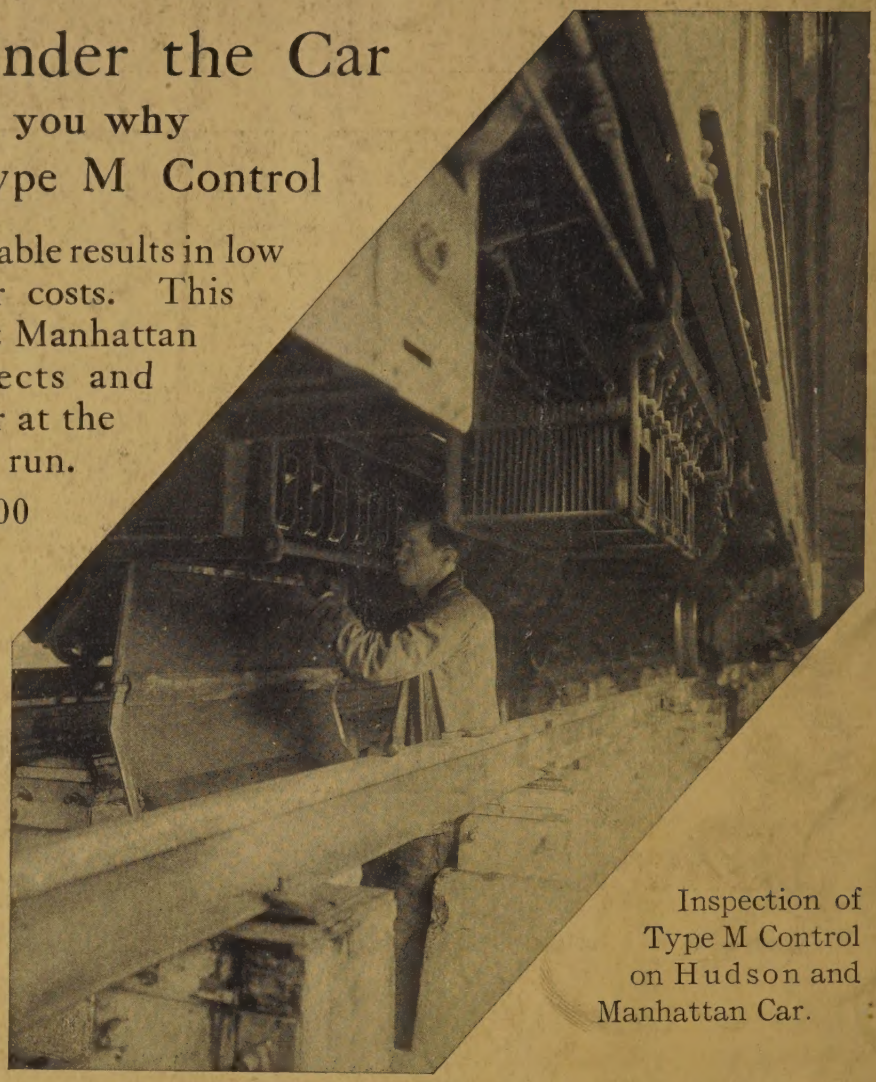
THE J.G.BRILL COMPANY, PHILADELPHIA

# The Man Under the Car

## will tell you why

## Sprague G-E Type M Control

produces such remarkable results in low inspection and repair costs. This man in the Hudson & Manhattan Railroad shops inspects and tests a car in one hour at the end of each 1200 mile run.



Inspection of Type M Control on Hudson and Manhattan Car.

At the end of 120,000 miles service (two or three years) this man with one helper overhauls the entire control system on one car in one ten-hour day. There are no delicate adjustments and no "squeeze fits," for he merely replaces stock parts costing $10.00 or $12.00, which amount, together with the ten hours time, represents the average maintenance expense for a 120,000 mile run.

Ease of inspection and repair are only two reasons why Type M Control is used so extensively in both city and interurban service.

The new Type MK control has the same inherent characteristics, only it is lighter and more compact—it is ideal for medium and light weight equipments in city service, where vestibule space is of the greatest value.

The Type MK control operates direct from the trolley—ask our local office about the "all-electric" control system.

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Largest Electrical Manufacturer in the World

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For Texas and Oklahoma business refer to General Electric Company of Texas,—Dallas, El Paso, Houston and Oklahoma City
For Canadian business refer to Canadain General Electric Company, Lt'd, Toronto, Ont.

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